KNOWLEDGE

WISDOM

POWER

OR,

A UNIVERSE OF THOUGHT AND FACT

EMBRACING

HISTORY SCIENCE, ART AND LITERATURE.

ILLUSTRATED.

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To

The People of the United States,

As an Humble Tribute

To the Magnificent Past, and

In Anticipation of the Still More Glorious Future

of a

Great and Noble Land,

We

Dedicate this Book.

THE PUBLISHERS.

IF through this life successfully we'd go,
The first essential for us is to KNOW
Ourselves and others, and the wonders done
Under that lord of centuries, the sun.

Then, having knowledge, we must next be WISE;
From merely knowing, to experience rise.
Experience puts all thoughts and facts in proper places,
And for the fight of life our nature braces.

So, friend, comes POWER; to know and how to act
Together joined; these make the living fact
Of Power. Reader, may Knowledge, Wisdom, Power,
Be yours increasingly through life's brief hour,

INTRODUCTION.

AT THE present day there is distinct room for a book which will give, in an interesting and readable way, definite and reliable information on many important subjects. This is no doubt an age of literature, so far as abundance in production goes, but very much that is written can neither be called interesting nor important, whilst, to have to search here and to search there for what one wants to know, is beyond the opportunity and the leisure of the most.

And yet every intelligent member of society wishes to make himself acquainted with the chief facts in history and government, especially in his own country; he desires to acquaint himself with the earth on which he lives, so that he may have some intelligent idea of its nature, features, treasures and capacities; so the practical arts, discoveries, inventions, which are the marvel of the present century, arrest his attention; music, painting, sculpture, architecture and the other fine arts claim his regard; and the world of ideas, in language and literature, create the desire to know something of the men who have peopled this world with their creations.

The field, no doubt, is vast; yet to obtain this information in small compass, and in an interesting form, must be the desire of very many indeed. Without instituting invidious comparisons, it may simply be said that this volume is as near an approach as has yet been attained toward supplying the desideratum, whilst its facts and figures are up to the present date.

Whilst it will prove a valuable book of reference, in which the utmost reliance may be placed, its interesting and varied information will, in itself, constitute a source of pleasure, as well as supply a means of education to those who hitherto have

been at a loss as to how to advance their attainments easily and systematically.

Any one becoming thoroughly conversant—and the character of the book will render valuable assistance — with history, science, the practical and fine arts, language, literature, law, medicine, and general knowledge, as exhibited in these pages, may be considered an exceedingly well informed and, indeed, a highly accomplished member of society.

It may be permitted the publishers to say by way of illustration, that in no book with which they are acquainted,— and they have examined as many as access can be had to,— is the history of English and American literature set forth with such fullness in so brief a compass; whilst, on the other hand, the reader will obtain information on such subjects as the Clearing House and the Board of Trade, concerning which so few know anything, whilst, at the same time, so many are curious.

In other portions of the volume, as that relating to famous persons and places, and to classical mythology, those possessing this volume will meet with much with which they have long desired to render themselves more familiar, and, perhaps, still more which they will be glad to chance on for the first time.

As will be readily perceived, the book is not only comprehensive in scope but symmetrical in structure. "Order is heaven's first law," and in observing that law, assistance is given of the most valuable kind to the mind, and especially to the memory. Nothing except utter unreliability or insipidity is more damaging to the usefulness of a book than the absence of method or arrangement. On the other hand, the most desirable structure of a volume is not one founded on a mere artificial order, but, as in the case of "Knowledge, Wisdom, Power," that which is mainly organic, arising out of the nature and relation of the subjects. In the preparation of this book it has been the earnest aim and constant desire of the publishers to furnish only the most reliable facts and figures; to what degree they have succeeded will be left to the reader to determine.

CONTENTS.

CHAPTER XI.

CHAPTER XII.

CHAPTER XIII.

CHAPTER XIV.

CHAPTER XV.

CHAPTER XVI.

CHAPTER XXI.

THE FINE ARTS. PAGES.

CHAPTER XXII.

MUSIC, PAINTING AND SCULPTURE.

CHAPTER XXIII.

ARCHITECTURE.

CHAPTER XXIV.

A PHILOLOGICAL RAMBLE.

CHAPTER XXV.

LANGUAGE AND STYLE.

CHAPTER XXVI.

AMERICAN LITERATURE. PAGES.

CHAPTER XXVII.

AMERICAN LITERATURE CONTINUED.

CHAPTER XXVIII.

ENGLISH LITERATURE.

CHAPTER XXIX.

THE BIBLE—FOREIGN MISSIONS.

CHAPTER XXX.

MISCELLANY. PAGES.

CHAPTER XXXI.

HOUSEHOLD REMEDIES.

CHAPTER XXXII.

HOUSEHOLD REMEDIES—CONTINUED.

CHAPTER XXXIII.

INTERSTATE COMMERCE LAW.

CHAPTER XXXIV.

EVERYBODY'S LAW. PAGES.

CHAPTER XXXV.

PSEUDONYMS OF EMINENT MEN.

CHAPTER XXXVI.

MYTHOLOGY.

ILLUSTRATIONS

DIAGRAMS.

CHAPTER I.

DISCOVERY AND DEVELOPMENT OF AMERICA.

GREENLAND was taken possession of by the Icelanders in A.D. 980. Christopher Columbus discovered the Bahama Islands in 1492, and the Isthmus of Darien in 1494: Sebastian Cabot, Florida, 1497; John and Sebastian Cabot, Newfoundland and Canada, 1497; Sebastian Cabot, North and South Carolina, 1498; Sebastian Cabot, Hudson Bay, 1512; De Soto, the Mississippi river, 1541; John Davis, Davis' strait, 1585; Henry Hudson, the Hudson river, 1608; William Baffin, Baffin Bay, 1616. Amerigo Vespucci in 1501 explored Brazil, and gave his name to this country.

In 1518 Mexico was discovered by the Spaniards, and in 1519 it was conquered by Cortez. In 1534 Canada was visited by Cartier, of St. Malo; a settlement having previously been made by Verrizani, who, in 1528, took possession in the name of Francis I, of France. In 1607 the English made their first permanent settlement at Jamestown, Va.; in 1614, several districts, including the present city of New York, were populated by Hollanders and Swedes. In 1620 the Puritan fathers landed on the bleak coast of Massachusetts. By 1770, England, after a series of conflicts, had captured the country occupied by French, Dutch and Swedish settlers, and was in possession of nearly the whole of North America, except Mexico, which was held by Spain. There were thirteen American colonies, which became the thirteen original states after the war of the Revolution, which broke out in 1775.

The causes of that war may be briefly stated. The colonists who were British subjects, justly conceived themselves to be harshly and selfishly dealt with. England seemed to act, prompted only by a desire for aggrandizement, and the very means employed to extort from the colonists their hard earned gains were such as to excite irritation. History has amply justified the action of the colonists. The Stamp tax required every document used in the trade or legal business of the colonies to bear a stamp, costing not less than about a quarter of a dollar, and a larger sum in proportion to the value of the document used. This tax was repealed, but, in 1767, another act of parliament taxed paper, glass, tea and other goods imported into the colonies. A search warrant authorized government officials to enter stores and private houses to search for contraband goods. Finally the obnoxious taxes were abrogated, with the exception of that on tea of three pence on each pound imported. The temper of the colonists was, however, by this time thoroughly aroused, and, on the first ship load of tea arriving in Boston harbor, the citizens boarded the vessel and threw the cargo into the sea.

The English government, determined to punish the recalcitrants, devised various oppressive measures and annoyances, and in the spring of 1775, the British soldiery and citizens of Concord and Lexington came into collision. Thus began the seven years' war, known as the war of the Revolution for American Independence.

LEADING EVENTS IN AMERICAN HISTORY.

A.D.

1492—America discovered by Christopher Columbus.
1499—Voyage of Amerigo Vespucci to America.
1517—Mexico discovered by Cordova.
1607—First English settlement at Jamestown, Va.
1609—The Hudson River discovered by Henry Hudson.
1614—New Amsterdam (now New York) built by the Dutch.
1630—City of Boston founded.
1664—New Amsterdam taken by the English.

1682—William Penn settles in Pennsylvania.
1717—New Orleans settled.
1732—Birth of George Washington, February 22.
1765—The Stamp Act passed in England, March 22.
Colonial Congress at New York October 7. Massachusetts, Rhode Island, Pennsylvania, Delaware, and Maryland unite. Stamp Act resisted November 1.
1766—Stamp Act repealed.
1767—Tax imposed by England on tea, paper, glass, etc.
1774—Declaration of Rights.
1775—Battle of Bunker Hill, June 17.
1776—Declaration of Independence by thirteen states.
1777—Battle of Princeton January 3, Washington defeats British.
France recognizes American Independence December 16.
1780—Benedict Arnold betrays his country.
1781—Congress meets, all the states having agreed on Articles of Confederation.
1782—Independence of United States recognized by Holland.
1783—Treaty of Paris, making peace with England September 13.
1785—John Adams, of Massachusetts, received as Minister to England.
1787—United States Constitution passed by convention, at Philadelphia, George Washington presiding.
1789—First Congress meets at New York; Washington elected first President of the United States.
1797—John Adams becomes President.
1799—Death of Washington, at Mount Vernon.
1800—Capital removed from Philadelphia to Washington.
1801—Thomas Jefferson President.
1804—Alexander Hamilton shot in a duel by Aaron Burr.
1807—Burr tried for conspiracy and acquitted.
1809—James Madison President.
1812—War declared with Great Britain.
1814—Treaty of peace signed with England at Ghent, December 24.

1817—James Monroe President.
1818—Illinois admitted to the Union.
1822—"Monroe Doctrine." declared; Independence of South American republics acknowledged.
1825—John Quincy Adams President.
1828—A "Protective" Tariff adopted.
1829—Andrew Jackson President.
1833—Andrew Jackson reëlected.
1837—Martin Van Buren President.
1839—United States Bank suspends payment.
1841—William H. Harrison President; dies April 4; John Tyler succeeds him April 6.
1842—Ashburton, or first Washington treaty, signed with England.
1844—First telegraph line; Joseph Smith, Mormon prophet, shot by the mob.
1845—James K. Polk President; War declared by Mexico.
1846—Northwestern boundary of United States fixed at 49°.
1848—Treaty signed with Mexico; Upper California ceded to United States; Gold discovered there.
1849—Zachary Taylor President; California "Gold Fever."
1850—Death of President Taylor July 9; Millard Fillmore takes the office July 10; Fugitive Slave Bill passed.
1851—Lopez's expedition to Cuba; visit of Louis Kossuth.
1853—Franklin Pierce President; New York International Exhibition.
1854—Anti-Slavery riots at Boston; Free Soil and Pro-Slavery struggle in Kansas.
1856—Slavery question distinctly to the front; Fremont, the candidate of the new Republican party, is defeated by James Buchanan.
1857—James Buchanan President; riots in New York; great commercial panic
1858—Difficulties with Mormons; Atlantic telegraph completed August 5.

1859—Walker's filibusters seized by United States troops; Harper's Ferry insurrection; John Brown hanged December 2.

1860—Presidential election in favor of Abraham Lincoln; South Carolina secedes from the Union; *Star of the West* fired on at Charleston.

1861—Confederate States of America formed February 4; Jefferson Davis declared President February 8; inaugurated February 18; Abraham Lincoln inaugurated March 4; attack on Fort Sumter April 12–13; President Lincoln calls for 75,000 volunteers; battle of Bull Run July 21; McClellan takes command of the army of the Potomac.

1862—President Lincoln calls for 300,000 volunteers; McClellan made commander-in-chief September 5; President Lincoln declares slaves free after January 1, if states do not return.

1863—Emancipation Proclamation by President Lincoln January 1; General Hooker given command of army of the Potomac.

1864—Grant becomes commander-in-chief; *Alabama* sunk by *Kearsage* off Cherbourg; McClellan nominated as President by Democrats.

1865—Andrew Johnson Vice-President March 4; General Lee surrenders to General Grant April 9; Abraham Lincoln assassinated by Wilkes Booth at Ford's Theater, April 14; Andrew Johnson takes oath as President April 15· Jefferson Davis captured May 10; end of civil war; President Johnson issues an amnesty May 30.

1866—President Johnson vetoes important bills; vetoes overruled; he makes a speech-making tour.

1867—Alaska purchased from Russia for $7,000,000; general amnesty proclaimed September 9.

1868—Articles of impeachment against President Johnson agreed upon by the House March 23; trial begins March 22; acquitted May 26; Presidential election, Grant defeats Seymour.

1869—Ulysses S. Grant President.

1870—Death of General Robert E. Lee, October 12.

1871—"Ku-Klux-Klan" outrages in North and South Carolina; great fire in Chicago October 8–11.

1872—Grant defeats Greeley in Presidential election; death of Horace Greeley November 29.

1873—Grant's second term begins.

1874—Beecher-Tilton scandal in Brooklyn; race conflicts in the South.

1875—Centenary celebration of Lexington and Bunker Hill; death of Andrew Johnson July 31.

1876—Massacre of Custer and his army by the Sioux; centenary of the founding of the Republic July 4; International Exhibition at Philadelphia; Presidential election, result doubtful; Electoral College casts 185 votes for Hayes, 184 for Tilden.

1877—Rutherford B. Hayes President; Chicago mob suppressed July 26; death of Brigham Young August 7.

1878—Bland's Silver Bill passed, vetoed by President Hayes.

1879—Lowell made Minister to England; Caleb Cushing dies at Madrid.

1880—Presidential election, Chicago's nominees, Garfield and Arthur, carried.

1881—James A. Garfield President; assassination of President Garfield by Charles J. Guiteau July 2, dies September 19; Chester A. Arthur President September 20.

1882—Longfellow died March 23; Guiteau hanged June 30.

1883—Opening of Brooklyn bridge May 24.

1885—General U. S. Grant died July 23.

1886—Great earthquake at Charleston; felt at Chicago.

1887—Interstate Commerce Bill comes into operation April 4; August Spies, Albert R. Parsons, George Engel and Adolph Fischer, condemned anarchists, executed in the Chicago jail November 11.

CHAPTER II.

BRIEF SYNOPSIS OF HISTORY.

CENTURY VIII. B.C.--776 is the earliest positive date of Greek history. The Olympic games began then, were held once in four years. Each period of four years was termed an Olympiad. Rome was founded in 753, and the Romans dated from that year,—thus A.U.C. 100, *i. e.*, from the year of the founding of the city 100.

(It will be observed that as we reckon time in history the numbers grow smaller and smaller as they approach the Christian era.)

CENTURY VII. B.C.—625, end of Assyria; Nineveh destroyed; Media and Babylonia divide her territory.

CENTURY VI. B.C—594 to 570, Solon's legislation; 558, Persia founded by Cyrus.

CENTURY V. B.C.—490, battle of Marathon; 480, battles of Thermopylæ and Salamis; 431 to 404, the great Peloponnesian war. Sparta becomes supreme.

CENTURY IV. B.C.—400, height of Spartan power; the Gauls take Rome; 333, Alexander the Great's first great fight with Persia; 301, battle of Ipsus, which settled the boundaries of Alexander's great kingdom.

CENTURY III. B.C.—264, beginning of first Punic war; 201, end of second Punic war; Rome is mistress of peninsular Italy.

CENTURY II. B.C.—Destruction of Carthage and Corinth; end of third Punic war and conquest of Greece; rapid degradation of Roman Politics.

CENTURY I. B.C.—100, Julius Cæsar born; 44, Cæsar assassinated; 31, battle of Actium, which threw all the power into the hands of Octavian (Augustus); 4, commonly received date of the birth of Jesus Christ.

CENTURY I. A.D.—70, destruction of Jerusalem; the Jews dispersed and their political existence ended.

CENTURY II. A.D.—180, end of the Good Emperors; Gibbon calls the time of the Good Emperors, "the period in the history of the world during which the condition of the human race was most happy and prosperous."

CENTURY III. A.D.—The first great army of the Goths crosses the Danube.

CENTURY IV. A.D.—313, edict of Milan; Christians favored and rights restored; the time of Constantine and the political success of Christianity; final division of the Empire into East and West; 325, council of Nice (Nicæa); 385, Paganism abolished.

CENTURY V. A.D.—451, defeat of the Huns under Attila; 486, Frankish kingdom founded in Gaul; 449, Saxon occupation of Britain; English history begins.

CENTURY VI. A.D.—Century of Justinian; 555, issue of "Civil Law;" silk culture brought from Persia to Eastern Empire.

CENTURY VII. A.D.—The Hejira, or flight of Mahommet; from July 22, 622, the Mohammedans reckon dates.

CENTURY VIII. A.D.—732, battle of Tours; Charles Martel defeats the Saracens, and stays their career of conquest on Christmas-day December 25; 800, Charlemagne is crowned Emperor of the West.

CENTURY IX. A.D.—At the beginning of this century the Empire of the West was usurped by a wicked woman, Irene; 900, near the close of the reign of Alfred the Great.

CENTURY X. A.D.—Battle of Augsburg when Otho I. nearly exterminates the Hungarians, who had been ravaging southern and central Europe; 987, accession of Hugh Capet.

Century XI. A.D.—1066, battle of Hastings; Norman conquest of England by William the Conqueror, 7th Duke of Normandy; to this century belongs Hildebrand, Pope Gregory VII.; 1096, first crusade moves.

Century XII. A.D.—1190, Frederick I., Barbarossa, drowned going on the third crusade.

Century XIII. A.D.—1215, Magna Charta; the first great struggle for English liberty; 1270, seventh (and last) crusade.

Century XIV. A.D.—1327 to 1377, time of Edward III., the greatest of the Plantagenet kings; 1337, Edward claims the crown of France, and the "Hundred Years' War" begins; 1314, battle of Bannockburn, Bruce defeats Edward II., and secures the independence of Scotland.

Century XV. A.D.—About 1436, invention of printing; 1453, Turks take Constantinople, and fall of Eastern Empire; English expelled from France, and end of "Hundred Years' War;" 1492, Columbus discovers America; 1429, battle of Patay or Orleans; Jeanne d'Arc defeats the English; 1455 to 1485, wars of the Roses, Red and White, Lancaster and York.

Century XVI. A.D.—1517, Reformation begins; the time of Leo X., Francis I., Charles V., Henry VIII., Luther, Loyola and Calvin; Polish and Turkish powers at their height; 1588, Spanish Armada defeated; reign of Elizabeth; 1598 edict of Nantes, which proclaimed toleration to Protestants in France.

Century XVII. A.D.—1618 to 1648, the thirty years' war which began from the tyrannous bigotry of Ferdinand of Austria, desolated and depopulated Germany, and ended the political power of the Empire; while in character, in intelligence, and in morality, the German people were set back two hundred years." 1649, Charles I. of England beheaded; beginning of the Commonwealth; 1688, "The glorious Revolution" in England; the revolution secured the liberties of England; William, Prince of Orange, became king; end of the Stuarts and beginning of the House of Brunswick, or Hanover on the British throne.

CENTURY XVIII. A.D.—1701 to 1713, war of the Spanish Succession (Queen Anne's war in America); career of Marlborough; 1763, France cedes Canada to England; 1776 American Declaration of Independence; 1789, French Revolution begins.

CENTURY XIX. A.D.—1804, Napoleon becomes emperor; 1815, battle of Waterloo; 1848, third French revolution; 1861 to 1865, Civil War in the United States; 1870 Rome again made capital of Italy; 1871, new German Empire, result of the Franco-German war; 1874, great famine in Bengal, 39,000,000 people affected; 1876, Russia declares war against Turkey; 1877, election of new Pope, Cardinal Pecci, as Leo XIII.; 1881, Emperor of Russia assassinated March 13; President Garfield shot July 2; 1882, Garibaldi died July 2; end of Afghan war which cost $117,500,000; 1884, Chinese government declares war against France; 1885, Victor Hugo died May 22; 1886, Colonial and Indian Exhibition at London visited by 550,745 persons; 1887, Queen Victoria's jubilee.

OUTLINES OF CANADIAN HISTORY.

A. D.

1497—Newfoundland discovered by John Cabot.

1534—Cartier's expedition to the gulf of St. Lawrence.

1535—Cartier's second voyage to Canada; he names the St. Lawrence and visits the sites of Montreal and Quebec.

1604—Port Royal founded.

1608—Champlain founds Quebec.

1611—Champlain founds Montreal.

1627—Cardinal Richelieu's scheme for colonizing Canada. War between England and France.

1629—The English capture Quebec, and Champlain is sent as a prisoner to England.

1633—Champlain returns to Quebec with new settlers.

1635—Death of Champlain.

1637—Island of Montreal settled.

1648-60—Wars with the Iroquois.

1664—War with the Mohawks.

1667—The French West India Company obtain a gift of Canada.
1674—Discovery of the Mississippi.
1689—Iroquois lay waste the island of Montreal.
1690—The British colonies resolve to invade Canada. Unsuccessful attack on Quebec by the British fleet.
1713—Treaty of Utrecht; Newfoundland and Nova Scotia ceded to the English.
1745—Capture of Louisburg by militia of Massachusetts.
1753—Commencement of hostilities with the English Colonies.
1755—Defeat of Braddock's army by the French and Indians.
1756—War between France and England.
1759—Death of Wolfe and Montcalm. Quebec taken by British.
1760—De Levi retakes Quebec. Montreal taken by British. Canada ceded to Great Britain.
1761—Canada formally made over to Great Britain.
1763—Introduction of English laws.
1768—Great fire in Montreal.
1774—Roman Catholics of Canada confirmed in their property and political rights.
1775—Commencement of the American War of Independence. Americans invade Canada. Montgomery unsucccssfully invests Quebec; his death.
1776—Americans retreat from Canada.
1784—Upper Canada settled.
1794—Toronto made capital of Upper Canada.
1803—Slavery abolished in Canada.
1812—Second war between United States and Britain; Americans carry Queenstown Heights.
1813—Capture of Toronto and Fort George by Americans
1814—Close of war.
1816—Sir John Sherbrooke, governor of Lower Canada.
1818—Duke of Richmond, governor of Lower Canada.
1822—English and French inhabitants of Lower Canada fall out.
1817-25—Upper Canada politically disturbed.
1824—Welland canal incorporated. First agitation against Orangemen.

1829—First agitation for responsible government in Upper Canada.

1830—Lord Aylmer, governor of Lower Canada.

1832—Imperial duties surrendered to the Assembly.

1835—Total separation from Great Britain claimed by the Papineau party.

1837—British Parliament adopts coercive measures. House of Assembly of Lower Canada refuses to transact business. Commercial crisis in Canada and United States. Rebellion in Upper Canada.

1838—End of rebellion in Upper Canada.

1839—Union of Upper and Lower Canada. Lord Sydenham, governor.

1840—Responsible government established. Death of Lord Sydenham. Settlement of the clergy reserves question.

1844—Removal of government to Montreal.

1845—Great fire at Quebec.

1847—Lord Elgin, governor.

1849—The opposition in assembly advocate annexation to the United States. Great riots in Montreal. Destruction of the Parliament House. Attack on Lord Elgin.

1850—Agitation for reciprocity with United States.

1852—Great fire at Montreal. Government removed to Quebec.

1855—Sir Edmund W. Head, governor.

1856—Sir John A. MacDonald, the attorney-general becomes leader of the conservatives.

1860—Visit of the Prince of Wales to Canada.

1861—Lord Monck, governor.

1865—Great fire at Quebec.

1866—Termination of Reciprocity Treaty with the United States. The Fenian invasion.

1867—Formation of the Dominion of Canada by the confederation of Canada, New Brunswick and Nova Scotia.

1870—Manitoba becomes part of the Dominion of Canada.

1871—British Columbia becomes part of the Dominion of Canada.

1872—Prince Edward's Island becomes part of the Dominion of Canada. Lord Dufferin, governor-general.

1878—The Marquis of Lorne appointed viceroy of Canada.

1885—Suppression of Indian rebellion in Northwest Territory. Riel captured and executed.

1886—Difficulties arise between United States and Canada on the Fisheries question.

A HISTORICAL CHART OF THE UNITED STATES.

Name of State.	Area in Square Miles.	Date of Settlement	By Whom Settled.	Where first Settled.	Date of admission to Union.	Capital City.
Florida	59,268	1565	Spaniards	St. Augustine	1845	Tallahassee.
Virginia	38,400	1607	English	Jamestown	1788	Richmond.
New York	47,000	1614	Dutch	Manhattan	1788	Albany.
Massachusetts	7,800	1620	English Puritans	Plymouth	1788	Boston.
New Hampshire	9,280	1623	English	Dover	1788	Concord.
New Jersey	8,320	1624	Dutch & Danes.	Burgen	1787	Trenton.
Maine	35,000	1625	English	Bristol	1820	Augusta.
Delaware	2,120	1627	Swedes & Fins	Cape Henlopen.	1787	Dover.
Connecticut	4,674	1633	From Mass	Windsor	1788	Hartford.
Maryland	11,124	1634	English	St. Mary's	1788	Annapolis.
Rhode Island	1,306	1636	English	Providence	1790	Providence & Newport.
North Carolina	50,704	1663	English	Albermarle	1789	Raleigh.
Wisconsin	53,924	1669	French	Green Bay	1848	Madison.
Michigan	56,451	1670	French	Detroit	1837	Lansing.
South Carolina	29,385	1670	English	Port Royal	1788	Columbia.
Pennsylvania	46,000	1682	English	Philadelphia	1787	Harrisburg.
Arkansas	52,198	1685	French	Arkansas Post	1836	Little Rock.
Texas	274,356	1690	Spaniards	San Antonio	1845	Austin.
Indiana	33,809	1690	French	Vincennes	1816	Indianapolis.
Louisiana	41,346	1699	French	Iberville	1812	New Orleans.
Alabama	50,722	1711	French	Mobile	1814	Montgomery.
Mississippi	47,156	1716	French	Natchez	1817	Jackson.
Illinois	55,410	1720	French	Kaskaskia	1818	Springfield.
Vermont	10,212	1725	From Mass	Fort Dummer	1791	Montpelier.
Georgia	58,000	1733	English	Savannah	1788	Atlanta.
Tennessee	45,690	1757	North Carolina.	Fort London	1796	Nashville.
Missouri	65,350	1764	French	St. Louis	1821	Jefferson City
California	188,981	1769	Spaniards	San Diego	1850	Sacramento.
Kentucky	37,680	1775	From Virginia	Boonesborough.	1792	Frankfort.
Ohio	39,964	1788	New England	Marietta	1803	Columbus.
Oregon	95,274	1811	From New York	Astoria	1869	Salem.
Iowa	55,045	1833	New England	Burlington	1846	Des Moines.
Minnesota	83,531	1846	New England	St. Paul	1857	St. Paul.
Kansas	181,318	1850	N. E. & W. States	Ft. Leavenworth	1861	Topeka.
Nebraska	75,995	1854	N. E. & W. States	Omaha	1867	Lincoln.
Colorado	104,500	1858	Western States.	Denver	1876	Denver.
Nevada	104,125	1861	From California	Washoe	1864	Carson City.
West Virginia	22,950	1607	English	Jamestown	1862	Charlestown.

TROOPS CALLED OUT DURING THE LATE CIVIL WAR.

1861.	Three months' men	75,000
1861.	Three years' men	500.000
1862.	Three years' men	300.000
1862.	Nine months' men	300,000
1864.	Three years' men, Feb.	500,000
1864.	Four years' men, March	200,000
1864.	Three years' men, July	500,000
1864.	Three years' men, Dec.	300,000
	Grand Total	2,675,000

SKETCH OF ENGAGEMENTS IN THE CIVIL WAR.

1861.—Attack on Fort Sumter, April 12, 13; mob attacks Massachusetts troops in Baltimore, April 19; skirmish at Philippi, June 3; battle of Big Bethel, June 10, Federal defeat. *Missouri*—Gen. Lyon defeats Confederates; Fremont takes command in the State; battle of Wilson's Creek, Lyon killed, August 10; Lexington surrenders, September 20. *Virginia*—Federals take Harper's Ferry, June 16; Rich Mountain, July 11; battle of Bull Run or Manasses, Federals routed July 21; Fort Hatteras taken by Gen. Butler, August 29; Battle of Ball's Bluff, Federals defeated October 21; Port Royal, S. C., taken November 8.

1862.—Battle of Big Sandy River, January 9; Mill Spring, Federal victory January 19; capture of Fort Henry, February 6; Fort Donelson, February 16; Roanoke Island, N. C., February 8; Nashville, February 23; battle of Pea Ridge, Confederate defeat March 7; The *Merrimac* sinks *Cumberland* and *Congress* at Hampton Roads, March 8; *Monitor* defeats *Merrimac*, March 9; Newbern, N. C., taken by Federals; battle of Winchester, Confederate defeat, March 23; Charleston blockaded; Shiloh, April 6; Island No. 10, April 7; Fort Pulaske, April 11; Yorktown evacuated by Confederates, May 3; battle of Williamsburg, May 5; New Orleans taken, April 25; Federals take Corinth, May 30; battle of Fair Oaks, May 31, June 1; Memphis taken June 6. Lee drives McClellan back; seven days fighting from the Chickahominy to the James, June 25 to July 1; President Lincoln calls for 300,000 volunteers; battle of Cedar Mountain; Banks defeated by "Stonewall" Jackson, August 9; second battle of Bull Run, September 1; Pope defeated by Jackson; Pope sent to the Northwest; McDowell superseded; McClellan made commander-in-chief, September 5; Confederates defeated at South Mountain, September 15; at Antietam, September 17; Harper's Ferry taken by Jackson, September 15; joins Lee; Federals lose Lexington and Mumfordsville; battle of Corinth, indecisive, October 4; Gen.

ATTACK ON THE ALBEMARLE.

Stuart (Confederate), enters Pennsylvania; battle of Fredericksburg, December 13; Burnside driven back; battle of Murphreesboro, December 31; January 1, Gen. Bragg (Confederate), defeated.

1863.—Gen. Hooker placed in command of the Army of the Potomac; Federal attack on Charleston repelled, April 7; battle of Grand Gulf and Port Gibson, in Mississippi; battle of Chancellorsville; Hooker defeated; Jackson mortally wounded May 2, 3; death of Jackson, May 10; Confederates defeated at Jackson, Miss., May 15; Grant invests Vicksburg, May 18; assault repelled May 22; Gen. Lee invades Maryland and Pennsylvania, in June; Hooker superseded by Meade, June 27; battle of Gettysburg, July 1-3; Confederates retreat; siege of Charleston, August 21; Fort Sumter destroyed; Quantrell burns Lawrence, Kan., August 21; battle of Chickamauga, September, 19, 20; Bragg defeats Rosecrans, who is superseded by Grant, Thomas, and Sherman; battle of Lookout Mountain; Thomas defeats Bragg, November 25; Missionary Ridge, November 26; Longstreet driven back, November 29.

1864.—Abortive attack on Richmond, February and March; Grant succeeds Hallock as commander-in-chief; Kirby Smith drives back Sherman, April 5; Fort Pillow Massacre, April 12; Army of Potomac crosses the Rapidan, May 4; Forrest's raids; battles of the Wilderness, May 5-7; Spottsylvania Court House, Federal success May 7-12; Gen. Sherman marches on Atlanta, May 7; Lee driven back on Richmond; Grant invests Petersburg, June 15; assault repulsed June 18; *Alabama*, commanded by Captain Semmes sunk by *Kearsage*, commanded by Commodore Winslow, June 19; Semmes escaped; Early invades Maryland, July 5; fights in front of Atlanta, July 20, 22, 24; explosion of Petersburg Mine, assault repulsed July 30; battle of Moorefield, W. Va., August 7; Farragut's Fleet at Mobile, August 5; Fort Powell blown up; Fort Gaines surrenders, August 8; Sheridan's forces in the Shenandoah Valley, August 9; retire to Charlestown, August 15; Kilpatrick's raid in Georgia,

August 18; battle of Jonesboro, Ga., August 31; surrender of Atlanta, Ga., September 1; battle of Winchester, Va., September 19; battle of Fisher's Hill, September 22; battle of Pilot Knob, Mo., September 23; Confederate Gen. Price defeated with great loss on several occasions in Missouri, October; battle of Allatoona, Ga., Confederate defeat, October 5; battle of Cedar Creek, Va., Sheridan defeats Early, October 19; bombardment and capture of Plymouth, N. C., October 29; Sherman's march from Atlanta to Savannah, November, capture of Savannah, Stoneman's raid in Virginia, December 15.

1865.—Capture of Fort Fisher, N. C., January 15; evacuation of Wilmington, N. C., January 21; battles at Fort Steadman and Hatcher's Run, Va., Unionist victory, February 6, 7; evacuation of Charleston, February 18; Sheridan's capture of Early's army in Shenandoah valley, March 2; battle of Averysboro, N. C., Confederates retreat March 16; battles near Bentonville, N. C., Sherman defeats Johnson with heavy loss, March 18-21; battle of Five Forks, Va., Sheridan defeats Lee, nearly 3,000 Confederates killed and wounded and 5,000 prisoners, April 1; evacuations of Petersburg, Va., April 1, 2; of Richmond, Va., April 2; Gen. Lee surrenders to Gen. Grant, April 9, at Appomattox Court House, Virginia, 27,000 officers and men paroled as prisoners of war; Lee's losses in killed and wounded from March 25 to April 3, estimated at more than 10,000; Mobile, Salisbury, N. C., and Columbus, Ga., captured by the Union army April 12; Sherman enters Raleigh, N. C., April 13; Gen. Johnson surrenders to the Unionists at Durham's Station, near Greensboro, N. C., April 26; Jefferson Davis captured May 10; close of the War of the Rebellion.

CHAPTER III

THE DECLARATION OF INDEPENDENCE.

ON July 2, 1776, at the Continental Congress, in session at Independence Hall, Philadelphia, the following resolution, introduced by Richard Henry Lee, was adopted :

"That these united colonies are, and of right ought to be, free and independent states ; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved."

On July 4, 1776, the Declaration of Independence, prepared by Thomas Jefferson, was passed amid the greatest enthusiasm. The thirteen British colonies then became known as the "Thirteen United States of America." They were Connecticut, Delaware, Georgia, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina and Virginia.

After setting forth the weighty reasons which had induced the Congress to take this step the Declaration concludes as follows :

"We, therefore, the representatives of the United States of America in General Congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name and by the authority of the good people of these colonies, solemnly publish and declare :— That these united colonies are, and of right ought to be, free and independent states ; and that they are absolved from all allegiance to the British crown, and that all political connection between them

is, and ought to be, totally dissolved; and that, as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts, which independent states may of right do. And, for support of this declaration, with a firm reliance on the protection of *Divine Providence,* we mutually pledge to each other our lives, our fortunes and our sacred honor."

THE CONSTITUTION OF THE UNITED STATES.

In 1787 a national convention met at Philadelphia, when after four months of deliberation the present Constitution of the United States was adopted. After having been transmitted to the various states for approval it was finally ratified by Congress March 4, 1789, and thenceforth became the law of the land.

SUMMARY OF THE CONSTITUTION

All legislative powers are vested in Congress consisting of a Senate and a House of Representatives.

The House of Representatives is composed of members chosen every second year by the people. A Representative must be twenty-five years of age; at least seven years a citizen of the United States, and an inhabitant of the state in which he is chosen. Representatives bear a proportion to the population of the state, based on the decennial census. Each state is entitled to at least one Representative.

The Senate is composed of members chosen by the state Legislatures. Each state is entitled to two Senators. The term of office is six years, and it has been so arranged that one third of the Senators go out of office every two years. A Senator must be at least thirty years of age; a citizen for nine years preceding his election; and an inhabitant of the state for which he is elected In case of vacancies in recess of the Legislature of any state the Executive has power to make temporary appointments.

The Vice-President of the United States is chairman of the Senate, but has only a casting vote.

The Senate has sole power to try all impeachments. Senators and Representatives receive compensation for their services. During attendance on their respective Houses they are (except for treason, felony, and breach of peace) privileged from arrest. The salary of Senators and Representatives is $7,000 and $5,000 respectively, per annum; that of the Speaker of the House $8,000. They are also allowed twenty cents per mile as mileage to and from Washington, for each annual session, and $125 per annum for newspapers and stationery. Eight dollars per day is deducted from their salaries for absence caused otherwise than by sickness.

THE PRESIDENT.

The executive power is vested in the President of the United States. He holds office for four years and (together with the Vice-President, chosen for the same term) is elected as follows:

The voters in each state cast their ballot for electors equal in number to the combined Senators and Representatives from the state. These electors meet at the capitols of their several states on the first Wednesday of December following the general election, which is held on the Tuesday after the first Monday in November. They cast their votes for President and Vice-President, make a list thereof, sign, seal, and certify to the same, and transmit the lists by special messenger to the President of the United States Senate. On a given day the houses of Congress hold joint session, when the votes so transmitted are opened by the President of the Senate, counted in presence of Congress, and the result declared. If no candidate receives a majority of electoral votes, the election is thrown into the House of Representatives who proceed at once to act. The President and Vice-President may be re-elected.

The qualifications for President and Vice-President are that they must be native-born citizens of the United States, resident at least for fourteen years, and at least thirty-five years of age.

The President is commander-in-chief of the army and navy, and of the militia in actual service. He appoints cabinet, judi-

cial and executive officers, with the Senate's approval, except those whose appointment comes within the operation of the civil service act. His salary is $50,000 per annum.

The Vice-President is President of the Senate, and in case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of his office, it devolves upon the Vice-President. His salary is $8,-000, as is also that of each of the Cabinet officers.

The order of succession in all cases where the presidential office becomes vacant during the term of four years, is: First, the Vice-President; second, Secretary of State; and in order, the Secretaries of Treasury, War, Attorney-General, Postmaster-General, Secretaries of the Navy and Interior. This is as amended by act of Congress January 19, 1886.

THE EXECUTIVE DEPARTMENTS.

These are seven in number: the Department of State, under the Secretary of State; the Treasury Department, under the Secretary of the Treasury; the War and Navy Departments, under their secretaries; the Postoffice Department, under the Postmaster-General; the Department of the Interior, under the Secretary of the Interior; and the Department of Justice, under the Attorney-General. These departments are subdivided into bureaus with each its head or chief.

The heads of departments constitute the Cabinet of the President.

The Secretary of State has the custody of the great seal, which, at the President's direction, he affixes to official documents. He treats with foreign nations through their resident ministers, conducts correspondence with ministers resident abroad, grants passports, etc., etc.

The Secretary of the Treasury superintends the financial affairs of the government; he recommends to Congress measures to the advantage of the nation's credit; negotiates loans, settles public accounts, etc., etc.

The Secretary of War controls military affairs, the construction of fortifications; he directs surveys, and has supervision of the engineer, subsistence, ordnance, topographical, medical and quartermaster-general's bureaus, and the adjutant-general's office.

The Secretary of the Navy superintends all naval affairs, including navy yards, building of war vessels, etc., etc.

The Secretary of the Interior has control of Indian affairs, pensions, patents, census, public buildings, general land office, etc., etc.

The Postmaster-General has control of all postal arrangements, both in the United States and with foreign nations.

The Attorney-General presides over the Department of Justice; he is a legal counsel for the President and other government officials; and the legal protector of the national rights.

RELATION OF STATES AND CONGRESS.

The state is sovereign over all minor divisions, such as townships and counties, and may change their boundaries and make laws governing their administration at pleasure. At the start the states claimed to hold the position of separate and independent nations, having entire control of their internal affairs, and this right they intended to reserve in forming the Union. They possessed also the right to regulate their relations with neighboring states and nations. This right, as also that of levying duties on imports, they surrendered to Congress.

In some matters the two houses which compose Congress must act together, whilst others fall within the particular province either of the Senate or of the House.

The Senate acts upon all treaties negotiated; ratifies or rejects them. It also acts similarly upon all nominations, made by the President, for the more important public offices. The House originates all bills for revenue, such as tariff and internal revenue bills, and has the sole power of impeaching public officers, while the Senate has the sole power of trying impeachments.

When the President is tried, as in the case of President Johnson, the Chief Justice of the Supreme Court presides. A conviction requires a two-thirds vote.

THE JUDICIAL BRANCH.

The judicial power of the United States is vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges both of the Supreme and inferior courts, hold their office during good behavior.

The Supreme Court is the final judicial resort of the nation.

The Court of Claims has exclusive jurisdiction in all suits on claims against the United States.

There are nine Circuit Courts having a jurisdiction over from three to six states each. The Chief Justice of the Supreme Court and his eight associates are assigned to these nine circuits, to hold the courts in them, but in actual practice a Circuit Judge is appointed for each circuit.

District Courts are held in fifty-eight districts. There are sometimes two or three districts in one state, and a district never overpasses the limits of a state. In some cases a district has its own district judge, but that functionary occasionally overtakes the work of two or three districts in the same state.

Two or three terms of the District are held in each district every year; and one or more sessions of the circuit. The judges can act for each other, a circuit for a district judge and *vice versa.*

The Circuit Courts have appellate jurisdiction over the District Courts in actions involving $50 or more. The Circuit Judges also appoint Commissioners within their circuits, who have certain prescribed powers, especially with reference to preliminary examinations in criminal charges.

The District Courts take cognizance of offenses and causes of action arising under the revenue, postal and patent laws, offenses against the currency etc.

The Supreme Court is in the main a court of appeal. The amount involved must exceed $5,000. It is the final authority on all questions involving a construction of the Constitution, as the Supreme Courts of the states decide finally all questions under their respective State Constitutions.

The salary of the Chief Justice of the Supreme Court is $10,500 per annum; of the Associate Judges $10,000 each.

CITIZENSHIP AND NATURALIZATION.

All persons born or naturalized in the United States and subject to the jurisdiction thereof, are citizens of the United States, and of the state in which they reside. The right of citizens of the United States to vote is not denied or abridged by the United States or any state on account of race, color, or previous condition of servitude.

Naturalization requires an individual (alien) to have lived within the territory of the United States for five years immediately before his application. He must also have resided during one year of the five in the state or territory in which he makes his application. Two years before he can be legally naturalized, he must go before a Federal court, or some local court of record, or the clerk of either of such courts, and make an affidavit that he proposes to become a full citizen of the United States at the proper time, etc. In most states this declaration entitles him to vote. In Illinois the law requires that the voter must be a citizen.

The voter must be a male, 21 years of age, and resident in the state where he votes a definite length of time.

In Illinois the residence required is, — state, one year; county, ninety days; election district, thirty days.

CHAPTER IV.

FORM OF GOVERNMENT IN THE UNITED STATES.

THE government of the United States is both in form and spirit Republican or Democratic. These words really have reference to the same thing, although having been adopted for political purposes by different parties, their wider and fundamental meaning has, to a certain extent, been observed. The idea of a Republic or Democracy is government for the people and by the people. Older nationalities rather began at the other end. The people existed for the state, not the state for the people. Theirs was

> "The good old rule, the simple plan,
> "That he should take who had the power,
> "And he should keep who can."

They were hampered by such conceptions as that involved in "the divine right of kings." Aristocracies arising naturally enough, took possession of all power and property. Steps towards freedom and a juster division of things in the Old World, have been mainly a modification of this state of matters, which, unfortunately, the church on the whole has lent its vast influence to perpetuate. Sometimes reform has involved conspiracy, massacre, war and all the horrors of violent revolution, as in France. In England the change has proceeded generally by slow and partial modification of existing laws.

America had the advantage of beginning *de novo*. We have not in the United States the spectacle of a people growing up out of barbarism into civilization, encumbered by traditions and effete ideas, but of a nation enriched with the thought and

experience of all the ages, unshackled by the past, free to frame a constitution from all that reason approved of as best. The constitutions of the various states, and that of the United States is founded on human law and practice, taking us back as far as the palmy days of ancient Rome.

Every form of government that is stable is founded on reason, and its divisions are not artificial, but natural. Even in this country the constitution has been subject to mortification and progress because at no point of time can human experience be said to be complete, but the fundamental idea of a Republic has all along been maintained. As long as that is jealously conserved, particular measures, even although they may be unwise or unjust, are not likely to do permanent harm.

The three divisions into which government naturally falls are the Legislative, Executive and Judicial. To Congress belongs the Legislative, to the President the Executive, and the Courts the Judicial functions.

GOVERNMENT OF CANADA.

The executive authority of the country is vested in the sovereign of Great Britain represented by a Governor-General assisted by a Privy Council. The legislative power is vested in a Parliament consisting of an Upper House, styled the Senate, and a House of Commons. The seat of the government for the Dominion is Ottawa. The Imperial Act uniting Canada, Nova Scotia, and New Brunswick, came into force March 29, 1867.

Either English or French may be employed in the debates of both Houses of Parliament.

There are eight provinces, viz: Ontario, Quebec, Nova Scotia, New Brunswick, British Columbia, Prince Edward Island, Manitoba, and Northwestern Territories.

Each province has a Legislature, which makes laws in relation to matters which concern itself and are not dealt with by the Parliament of the Dominion. These include: Direct taxa-

tion within the province, to provide revenue for provincial purposes; the borrowing of money on the sole credit of the province; the establishment and tenure of provincial offices and the appointment and payment of provincial officers; the management and sales of public lands belonging to the province, and of the timber and wood thereon; the establishment, maintenance, and management of public and reformatory prisons in and for the province; the establishment, maintenance and management of hospitals, asylums, charities, and eleemosynary institutions in and for the province, other than marine hospitals; municipal institutions in the province; shop, saloon, tavern, auctioneer and other licenses in order to the raising of a revenue for provincial, local or municipal purposes; local works and undertakings *other* than such as are of the following classes: (a.) Lines of steam and other ships, railways, canals, telegraphs, and other works and undertakings connecting the province with any other province, or extending beyond its limits. (b.) Lines of steamships and any British or foreign country. (c.) Such works as, although wholly situate within the province, are before or after the execution, declared by the parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces. The provincial Legislatures deal also with the incorporation of companies with provincial objects; the solemnization of marriage in the province; property and civil rights in the province; the administration of justice in the province, including the constitution, maintenance and organization of provincial courts, both of civil and of criminal jurisdiction, and including procedure in civil matters in those courts; the imposition of punishment by fine, penalty or imprisonment, for enforcing any law of the province made in relation to any matter coming within any of the classes enumerated in this section; generally all matters of a merely local and private nature in the province.

In each of the provinces the Legislature makes laws in reference to education; but the rights of denominational schools are carefully guarded.

Each province has a Lieutenant Governor appointed by the the Governor-General in council. . The Governor-General also appoints the Judges of the Superior, District and County Court, in each province, except those of Probate in Nova Scotia and New Brunswick.

PRINCIPAL CITIES OF THE DOMINION OF CANADA, CENSUS 1881.

CITY.	PROVINCE.	POPUL'TN.	INCREASE SINCE 1871
Montreal	Quebec	140,747	33,522
Toronto	Ontario	86,415	30,323
Quebec	Quebec	62,446	2,747
Halifax	Nova Scotia	36,100	6,518
Hamilton	Ontario	35,961	9,245
Ottawa	Ontario	27,412	5,867
St. John	New Brunswick	26,127	*——
London	Ontario	19,746	3,920
Portland	New Brunswick	15,226	2,706
Kingston	Ontario	14,091	1,684
Charlottetown	Prince Edward Island	11,485	2,678
Guelph	Ontario	9,890	3,012
St. Catherine	Ontario	9,631	1,767
Brantford	Ontario	9,616	1,509
Belleville	Ontario	9,516	2,211
Three Rivers	Quebec	9,286	1,100
St. Thomas	Ontario	8,367	6,170
Stratford	Ontario	8,239	3,926
Winnipeg	Manitoba	7,985	7,744
Chatham	Ontario	7,873	2,000
Brockville	Ontario	7,609	2,507
Levis	Quebec	7,597	906
Sherbrooke	Quebec	7,227	2,795
Hull	Quebec	6,890	.....
Peterborough	Ontario	6,812	2,201
Windsor	Ontario	6,561	2,308
St. Henri	Quebec	6,415	.....

Fredericton	New Brunswick	6,218	212
Victoria	British Columbia	5,925	2,655
St. Jean Baptiste	Quebec	5,874	1,466
Sorel	Quebec	5,791	155
Port Hope.	Ontario	5,585	471

*Decrease; great fire in 1877.

AREA OF PROVINCES, CAPITALS, MALE AND FEMALE POPULATION.

PROVINCE.	AREA.	CAPITAL OF PROVINCE.	MALES.	FEMALES.
Ontario (Ont.)	65,111,463	Toronto	976,470	946,758
Quebec (Que)	120,764,651	Quebec	678,175	680,852
Nova Scotia (N. S.)	13,392,003	Halifax	220,538	220,034
New Brunswick (N. B.)	17,393,410	Fredericton	164,119	157,114
British Columbia (B. C.)	218,435,200	Victoria	29,503	19,956
Prince Edward Island (P. E. I.)	1,365,400	Charlottetown	54,729	54,162
Manitoba (Man.)	78,848,040	Winnipeg	37,207	28,747
N. W. Territories (N. W T.)	1,705,761,280	Regina	28,113	28,333
Totals	2,221,061,447		2,188,854	2,135,956

Total population of Canada, 4,324,810.

STATES AND TERRITORIES.

ABBREVIATIONS — POPULAR NAMES — GOVERNOR'S TERM AND SALARY — POPULATION (1880) — RANK — AREA — ELECTORAL VOTE.

Alabama. (Ala.) "Here we rest." Governor's term, two years. Salary, $3,000 per annum. Population, 1,262,505. Rank, 17. Area, 51,540. Electoral vote, 10.

Arkansas. (Ark.) "Bow of smoky waters." Popular name, "Bear State." Governor's term, two years. Salary per annum, $3,000. Population, 802,525. Rank, 24. Area, 53,045. Electoral vote, 7.

California. (Cal.) "Hot furnace." Popular name, "Golden State." Governor's term, four years. Salary per annum, $6,000. Population, 864,694. Rank, 23. Area, 155,980. Electoral vote, 8.

Colorado. (Colo.) "Colored." Governor's term, two years. Salary per annum, $5,000. Population, 194,329. Rank, 34. Area, 103,645. Electoral vote, 3.

Connecticut. (Conn.) "Long River." Popular names, "Freestone State," "Nutmeg State." Governor's term, two years. Salary per annum, $2,000. Population, 622,700. Rank, 27. Area, 4,845. Electoral vote, 6.

Delaware. (Del.) Named after Lord De La War. Popular name, "The Diamond State." Governor's term, four years. Salary per annum, $2,000. Population, 146,608. Rank, 36. Area, 1,960. Electoral vote, 3.

Florida. (Fla.) "Flowery." Popular name, "Peninsular State." Governor's term, four years. Salary per annum, $3,-500. Population, 269,493. Rank, 33. Area. 54,240. Electoral vote, 4.

Georgia. (Ga.) Named after George II. of England. Popular name, "Empire State of the South." Governor's term, two years. Salary per annum, $3,000. Population, 1,542,180. Rank, 13. Area, 58,980. Electoral vote, 12.

Illinois. (Ill.) "Tribe of Men." Popular names, "Sucker State," "Prairie State." Governor's term, four years. Salary, $6,000. Population, 3,077,871. Rank, 4. Area, 56,000. Electoral vote, 22.

Indiana. (Ind.) From the Indians. Original meaning of India is River. Popular name is "Hoosier State." Governor's term, four years. Salary per annum, $5,000. Population, 1,978,301. Rank, 6. Area, 35,910. Electoral vote, 15.

Iowa. (Ia.) The sleepy ones." Popular name, "Hawkeye State." Governor's term, two years. Salary per annum, $3,000. Population, 1,624,615. Rank, 10. Area, 55,475. Electoral vote, 13.

Kansas. (Ks.) "Smoky water." Popular name, "Garden of the West." Governor's term, two years. Salary per annum, $3,000. Population, 996,096. Rank, 20. Area, 81,700. Electoral vote, 9.

term, one year. Salary per annum, $1,000. Population, 276,-531. Rank, 32. Area, 1,085. Electoral vote, 4.

South Carolina. (S. C.) For Charles II. of England. Popular name, "Palmetto State." Governor's term, two years. Salary per annum, $3,500. Population, 995,577. Rank, 21. Area, 30,170. Electoral vote, 9.

Tennessee. (Tenn.) "River of the Big Bend." Popular name, "Big Bend State. Governor's term, two years. Salary per annum, $4,000. Population, 1,542,359. Rank, 12. Area, 41,750. Electoral vote, 12.

Texas. (Tex.) "Friends." Popular name, "Lone Star State." Governor's term, two years. Salary per annum, $4,000. Population, 1,591,749. Rank, 11. Area, 262,290. Electoral vote, 13.

Vermont. (Vt.) "Green Mountain." Popular name, "Green Mountain State." Governor's term, two years. Salary per annum, $1,000. Population, 332,286. Rank, 31. Area, 9,135. Electoral vote, 4.

Virginia. (Va.) For Elizabeth, Queen of England. The "Virgin Queen." Popular names, "Mother of States," "Mother of Presidents," "Old Dominion." First settled of the thirteen states which united in the Declaration of Independence. Governor's term, four years. Salary per annum, $5,000. Population, 1,512,565. Rank, 14. Area, 40,125. Electoral vote 12.

West Virginia. (W. Va.) Popular name, "Panhandle State." Governor's term, four years. Salary per annum, $2,700. Population, 618,457. Rank, 28. Area, 24,645. Electoral vote, 6.

Wisconsin. (Wis.) "Flowing westward." Popular name, "Badger State." Governor's term, two years. Salary, per annum, $5,000. Population, 1,315,497. Rank, 16. Area, 54,450. Electoral vote, 11.

Arizona Territory. (Ariz.) "Sandheels." Governor's term, four years. Salary per annum, $2,600. Population, 40,440. Rank, 42. Area, 112,920.

North and South (Dak.) "Allied." Governor's term, four years.

Salary per annum, $2,600. Population, 135,177. Rank, 38. Area, 147,700.

Idaho. Governor's term, four years. Salary per annum, $2,600. Population, 32,610. Rank, 44. Area, 84,290.

Montana. (Mon.) Governor's term, four years. Salary per annum, $2,600. Population, 128,163. Rank, 43. Area, 145,310.

New Mexico. (N. M.) Governor's term, four years. Salary per annum, $2,600. Population, 119,565. Rank 43. Area, 122,460.

Utah Ter. (Utah.) Named from the Indian tribe, "Utes." Governer's term, four years. Salary per annum, $2,600. Population, 143,963. Rank, 37. Area, 82,190.

Washington. (Wash.) Named from President Washington. Governor's term, four years. Salary per annum, $2,600. Population, 75,116. Rank, 40. Area, 66,880.

Wyoming. (Wyo.) "Large Plains.) Governor's term four years. Salary per annum, $2,600. Population, 120,789. Rank, 45, Area, 97,575.

District of Columbia. Population, 229,796. Area, 60,

Total population, ... 66,000,000.

Total area,. . . . . 2,903,176 square miles.

Total electoral vote, ... 401.

POPULATION OF THE PRINCIPAL CITIES OF UNITED STATES.

(Census 1890.)

New York	1,513,501	Cleveland, O	261,546
Chicago	1,098,576	Buffalo, N. Y	255,543
Philadelphia	1,044,894	New Orleans, La	241,995
Brooklyn, N. Y	804,377	Pittsburg, Pa	238,473
St. Louis, Mo	460,367	Washington, D. C	228,160
Boston, Mass	446,507	Detroit, Mich	207,791
Baltimore, Md	433,639	Milwaukee, Wis	203,979
San Francisco, Cal	297,990	Newark, N. J	182,020
Cincinnati, O	296,209	Louisville, Ky	185,756

Minneapolis, Minn.	164,780
Jersey City, N. J.	163,987
Omaha, Neb.	139,742
Rochester, N. Y.	135,302
St. Paul, Minn.	133,156
Providence, R. I.	132,043
Denver, Colo.	126,186
Indianapolis, Ind.	125,000
Kansas City, Mo.	105,000
Allegheny, Pa.	104,967
Scranton, Pa.	95,000
Albany, N. Y.	93,523
Syracuse, N. Y.	90,000
Columbus, O.	90,398
New Haven, Conn.	85,981
Worcester, Mass.	84,536
Toledo, O.	82,652
Richmond, Va.	80,300
Paterson, N. J.	78,300
Lowell, Mass.	77,605
Memphis, Tenn.	75,360
Fall River, Mass.	74,351
Grand Rapids, Mich.	70,000
Cambridge, Mass.	69,837
Dayton, O.	65,000
Wilmington, Del.	61,437
Troy, N. Y.	60,605
Reading, Pa.	58,750
Trenton, N. J.	58,484
Lynn, Mass.	55,684
Hartford, Conn.	53,182
Evansville, Ind.	50,674
Bridgeport, Conn.	48,856
Oakland, Cal.	48,590
Utica, N. Y.	45,000
Lawrence, Mass.	44,559
Springfield, Mass.	44,164
Manchester, N. H.	43,983
Savannah, Ga.	41,762
St. Joseph, Mo.	40,900
Peoria, Ill.	40,758
New Bedford, Mass.	40,705
Harrisburg, Pa.	40,164
Erie, Pa.	40,151
Wheeling, W. Va.	40,000
Portland, Me.	36,608
Quincy, Ill.	36,400
Lancaster, Pa.	35,000
Terre Haute, Ind.	30,289

Area of Chicago: Length, north to south, $24\frac{1}{2}$ miles; width, east to west, $14\frac{1}{2}$ miles; total area of city, 175 square miles.

UNITED STATES DEBT AT THE END OF EACH ADMINISTRATION.

1796—George Washington	$ 83,762,172 07
1800—John Adams	82,976,294 35
1808—Thomas Jefferson	65,196,317 87
1816—James Madison	127,334,933 74
1824—James Monroe	90,269,777 77

1828—John Quincy Adams, . . .	67,445,043 87
1836—Andrew Jackson, . . .	37,513 05
1840—Martin Van Buren, . . .	3,573,343 82
1841—William H. Harrison, . . .	5,250,875 54
1844—John Tyler, . . .	23,461,652 50
1848—James K. Polk, . . .	47,044,862 23
1849—Zachary Taylor, . . .	63,061,858 69
1852—Millard Filmore, . . .	66,199,341 71
1856—Franklin Pierce, . . .	31,972,537 96
1860—James Buchanan, . . .	64,842,287 88
1865—Abraham Lincoln . . .	2,680,647,869 74
1868—Andrew Johnson . . .	2,611,687,851 19
1876—Ulysses S. Grant, . . .	2,180,395,067 15
1880—Rutherford B. Hayes . . .	2,120,415,370 65
1881—James A. Garfield, . . .	2,069,013,569 58
1883—Chester A. Arthur . . .	1,884,171,728 07

LOSSES IN AND COST OF THE CIVIL WAR.

Federal soldiers killed in battle, 61,362. Died afterwards, 34,727. Died of disease, 183,287. Total, 279,376. Deserted, 199,105.

Approximate loss of Confederates from wounds and disease, 133,821. Deserted (partial statement), 104,428. Killed in action (estimated), 51,525. United States troops captured, 212,608; Confederates, 476,169. Died while prisoners, United States troops, 29,725; Confederate, 26,774. Cost of war, direct and indirect, $6,189,929,908.

CHAPTER V.

IMMIGRATION.

THE total number of immigrants from 1820 to 1882 (June 30) was 11,597,181. In 1885 the number was 395,346.

The total number of Chinese in the census of 1880 was 105,465. By a law passed in 1882 Chinese immigration has been stopped for ten years.

By the same census the foreign born element in the United States formed 9.5 per cent of the population; of that percentage 41.2 were natives of Great Britain, and two-thir ds ofthese were Irish. Of the total foreign born element 71 per cent came from Great Britain and Germany. Of New York City one-third of the population is of foreign birth. In Chicago 40 per cent of the population are foreigners, who represent the following countries: Ireland, Prussia and German States, Canada, England, Sweden, Bohemia, Norway, Holland, Scotland, Bavaria, Poland, Denmark, Austria, Belgium, France, Italy, Switzerland, Russia, China, Australasia, South America, Spain, West Indies.

INDIANS.

There were in 1880 in the United States (including Alaska) 339,098 Indians. Of these 243,527 inhabited the Indian Territory, or were attached to the Indian agency; and 66,407 outside, or tax-paying Indians. In 1882 the government spent nearly $10,000,000 on the Indians, and, in 1883, $7,362,590. There were 66 agencies throughout the states

NORTH AMERICAN INDIANS.

The Indian reservations of the United States contain 200,000 square miles, and their poplution is about 260,000. Twenty-six thousand square miles would locate each family upon a half-section of land, leaving a surplus of about 170,000 square miles, which would produce annually $4,480,000. This amount exceeds by about $660,000 the entire sum appropriated for the payment of their subsistence and civilization. Whilst some tribes ignore the interest taken in their welfare and civilization, there are other tribes who begin to see the wisdom of embracing the opportunities afforded them, and are gradually locating on farms and engaging in agricultural pursuits. Had they not so long and persistently fought against the inevitable, and had they accepted the path of civilization sooner, their present condition would have been less unfortunate and their race would now have been less decimated.

Slowly but surely has each tribe diminished, until some have become extinct, whilst others have but a few of their members left. Among the more industrious tribes the Crow Indians are deserving of mention. Three hundred and ninety-seven families the Crows are located on four hundred farms allotted to them. As agriculturists these Indians are doing well, caring for their tracts under cultivation, two or three acres each, much better than many would suppose.

The system of irrigation on their reservation promises to work well, and the Crows are rapidly becoming subservient to the ways of the white man. The Government has supplied them with excellent implements for farming, which they are beginning to use to advantage. They have four thousand head of good cattle, distributed over their four hundred farms, and between ten thousand and twelve thousand horses, which, while many of them are small ponies, represent a share of the extensive wealth for which the Crow nation is noted.

The tolls collected on cattle passing through the reservation is a source of considerable revenue. Indian schools have been established in several States and Territories, agriculture being one of the main features.

FOREIGN COUNTRIES, POPULATION, GOVERNMENT, ETC.

Country.	Population.	Area in square Miles.	Capital.	Religion.	Government.
China (Est.) including Corea	388,631,975	4,503,788	Pekin	Buddhistic	Empire.
India	253,906,449	1,383,504	Calcutta	Buddhism	Empire.
				Brahminism	
				Hindooism	
				Parseeism	
Russia (estimated)	102,682,124	8,520,637	St. Petersburg	Greek Church	Empire.
United States and Territories	50,497,097	3 629,012	Washington	Protestant & Catholic	Republic.
Turkish Empire (estimated)	42,209,359	2,406,492	Constantinople	Mohammedan	Monarchy.
German Empire	45,234,061	212,028	Berlin	Protestant & Catholic	Empire.
Austria — Hungary	37,786,346	210,942	Vienna	Catholic	Empire.
France	37,672,048	204,092	Paris	Catholic	Republic.
Japan	36,700,118	148,456	Tokio	Buddhistic	Empire.
Great Britain and Ireland	35,026,108	120,832	London	Protestant	Monarchy.
Italy	28,459,451	114,926	Rome	Catholic	Monarchy.
Spain (estimated	16,061,859	182,756	Madrid	Catholic	Monarchy.
Mexico (estimated)	10,006,882	743,948	Mexico City	Catholic	Republic.
Brazil	9,448,233	3,275,326	Rio Janeiro	Catholic	Monarchy.
Belgium	5,655,197	11,373	Brussels	Catholic	Monarchy.
Bavaria	5,284,779	29,375	Munich	Catholic	Monarchy.
Sweden	4,603,595	170,979	Stockholm	Protestant	Monarchy.
Persia (estimated)	7,653,600	610,000	Teheran	Mohammedan	Monarchy.
British America	4,324,810	3,470,392	Ottawa	Protestant	Monarchy.
Holland — Netherlands	4,225,065	12,648	The Hague	Protestant	Monarchy.
Portugal	4,160,315	36,510	Lisbon	Catholic	Monarchy.
Colombia	4,000,000	504,773	Bogota	Catholic	Republic.
Australasia	3,091,897	3,075,135			
Seven colonies of the British Government					
New South Wales			Sidney	Protestant	Monarchy.
Victoria			Melbourne	Protestant	Monarchy.

Queensland	....	....	Brisbane	Protestant	Monarchy.
South Australia	....	....	Adelaide	Protestant	Monarchy.
Western Australia	....	....	Perth	Protestant	Monarchy.
New Zealand	....	....	Auckland	Protestant	Monarchy.
Tasmania	....	....	Hobart Town	Protestant	Monarchy.
Peru	3,049,945	503,718	Lima	Catholic	Republic.
Switzerland	2,846,102	15,992	Berne	Protestant	Republic.
Chili (estimated)	2,377,949	256,399	Santiago	Catholic	Republic.
Bolivia	3,300,000	....	La Paz	Catholic	Republic.
Argentine Republic	2,026,000	1,125,086	Buenos Ayres	Catholic	Republic.
Denmark (estimated)	2,018,432	13,784	Copenhagen	Protestant	Monarchy.
Wurtemberg	1,971,118	7,675	Stuttgart	Protestant	Monarchy.
Norway	1,925,000	122,869	Christiania	Protestant	Monarchy.
Venezuela	2,121,988	632,695	Caracas	Catholic	Republic.
Greece	1,979,305	25,041	Athens	Greek Church	Monarchy.
Baden	1,570,254	5,851	Karlsruhe	Catholic	Grand Duchy.
Guatemala	1,278,311	41,830	New Guatemala	Catholic	Republic.
Liberia	1,068,000	14,300	Monrovia	Protestant	Republic.
Ecuador (estimated)	1,066,137	25,122	Quito	Catholic	Republic.
Hesse	947,224	2,866	Darmstadt	Protestant	Grand Duchy.
Hayti (estimated)	800,000	10,204	Port au Prince	Catholic	Republic.
Uruguay	700,000	73,538	Montevideo	Catholic	Republic.
San Salvador	554,785	7,225	San Salvador	Catholic	Republic.
Honduras	458,000	39,600	Tegucigalpa	Catholic	Republic.
San Domingo	350,000	18,045	San Domingo	Catholic	Republic.
Paraguay	476,048	91,970	Asuncion	Catholic	Republic.
Nicaragua	275,815	49,500	Managua	Catholic	Republic.
Costa Rica	180,000	26,046	San Jose	Catholic	Repnblic.
Hawaii (estimated)	73,000	6,677	Honolulu	Protestant	Monarchy.

LEGAL HOLIDAYS IN THE UNITED STATES.

New Year's Day, January 1st. Except in Arkansas, Delaware, Georgia, Kentucky, Maine, Massachusetts, New Hampshire, Rhode Island and North and South Carolina.

Washington's Birthday, Febuary 22nd. Except in Alabama, Arkansas, Florida, Illinois, Indiana, Iowa, Kansas, Maine, Missouri, North Carolina, Ohio, Oregon, Tennessee and Texas.

Decoration Day, May 30th. Only in Colorado, Connecticut, Maine, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Wisconsin.

Independence Day, July 4th. A legal holiday in all the states and territories.

Thanksgiving Day and public fast days, are appointed by the President of the United States and are legal holidays. Any state by proclamation of the Governor may create legal holidays set apart for religious observances.

Days appointed for general elections, state or national, are legal holidays in California, Maine, Missouri, New Jersey, New York, Oregon, South Carolina and Wisconsin.

January 8th., the anniversary of the battle of New Orleans, February 12th., the anniversary of the birth of Abraham Lincoln, and March 4th., the Fireman's anniversary, are legal holidays in Louisiana.

Good Friday. The friday before Easter Sunday is a legal holiday in Florida, Louisiana, Minnesota and Pennsylvania.

Shrove Tuesday, the Tuesday before Lent is a legal holiday in Louisiana, and the cities of Alabama, Mobile, Montgomery and Selma.

Memorial Day, April 20th., is a legal holiday in Georgia.

March 2nd., the anniversary of the Independence of Texas, and April 21st., that of the battle of San Jacinto, are legal holidays in Texas.

THE SALARIES OF THE PRINCIPAL OFFICERS OF THE UNITED STATES.

President.	$50,000
Vice-President,	10,000
Speaker of House,	8,000
Heads of Departments,	8,000
Assistants,	3,500 to 6,000
Chiefs of Bureaus,	2,400 to 5,000
Clerks,	1,000 to 2,000
Ministers to France, Germany, Great Britain and Russia,	17,500
Ministers to Austria, Brazil, China, Italy, Japan, Mexico and Spain,	12,000
Ministers to Central America, Chili and Peru,	10,000
Ministers to other countries,	4,000 to 7,500
Secretaries of Legations,	1,800 to 3,000
Consuls,	1,500 to 6,000
Senators,	7,000
Representatives,	5,000
Clerks to the two Houses,	1,500 to 4,500
Librarian of Congress,	4,000
Public Printer,	3,600
Commissioner of Agriculture,	3,500
Chemist,	3,000
Clerks and assistants,	1,000 to 2,000
Superintendent of Coast Survey,	6,000
Superintendent of Life-saving Service,	4,000
Supervising Surgeon-General,	4,000
Supervising Inspector-General of Steamboats,	3,500
Chief of Secret Service,	3,500
Solicitor-General, Department of Justice,	7,000
Assistant Attorneys-General, each,	5,000
Solicitor of the Treasury,	4,500
Assistant,	3,000
Assistant Attorney-General for Post-Office Department	4,000

Examiner of Claims for State Department	$3,500
Chief Justice Supreme Court,	10,500
The eight Associate Justices, each	10,000
Clerk Supreme Court (estimated fees),	25,000
Reporter,	4,000
Marshal,	3,500
Chief Justice and four associates, Court of Claims, each	4,500
Clerk,	3,000
Circuit Judges,	6,000
District Judges,	3,500 to 5,000

The United States Government requires for the service of the two Houses a considerable staff of efficient officers. The Senate, when in session, has 160 to 170 employés in regular attendance at their distinctive duties; the complete list includes chaplain, librarian, clerks, clerks to committees, postmaster, keepers, messengers, mail-carriers, door-keepers, laborers, page, etc., etc.

The House when in session, has upon its pay-sheet over 250 employés in similar capacities.

The whole staff of officers required by the two Houses may be approximately stated at from 300 to 400. The complete list comprises librarian of Congress, assistants, clerks, mechanics, printers, binders, superintendents of grounds, police, laborers, and sundry minor officers.

The Executive Department proper engages the services of about twenty subordinate officers.

The various departments and branches of the administration require the services in all departments of a large force which may be stated in approximate numbers as follows:

State Department,	88
Treasury Department,	1,827
War Department,	900
Navy Department,	150
PostofficeDepartment,	2,670
Interior Department,	1,260

Department of Justice,	50
Department of Agriculture,	45
Grand total	6,990

The requirements of the government necessarily involve a constant and steady increase in the numbers of the officers employed for the wise and vigorous administration of its many and varied departments, and nothing is allowed to interfere with a thorough and efficient administration.

CHAPTER VI.

THE UNITED STATES ARMY.

THE President of the United States is the Commander-in-chief of the army. In times of peace the United States army consists of:

Five regiments of artillery.
Ten regiments of cavalry.
Twenty-five regiments of infantry.
An Adjutant-General's Department.
An Inspector-General's Department.
A Quartermaster's Department.
A Subsistence Department.
A corps of engineers.
A battalion of engineer-soldiers.
An Ordnance Department.
Enlisted men of the Ordnance Department.
A Medical Department, with its corps of hospital stewards.
A Pay Department.
A Bureau of Military Justice.
A force of Indian scouts, not exceeding 1,000.
Officers on the army retired list.
The Professors and Corps of Cadets.
A millitary band at West Point Military Academy.

NUMERICAL STRENGTH OF A REGIMENT.

A Regiment of Artillery consists of twelve batteries, each of which is served by a force not exceeding 122 private soldiers; the maximum strength of each regiment is therefore 1,464.

One battery in each regiment is equipped as light or flying artillery; to facilitate rapidity of motion seats are provided for

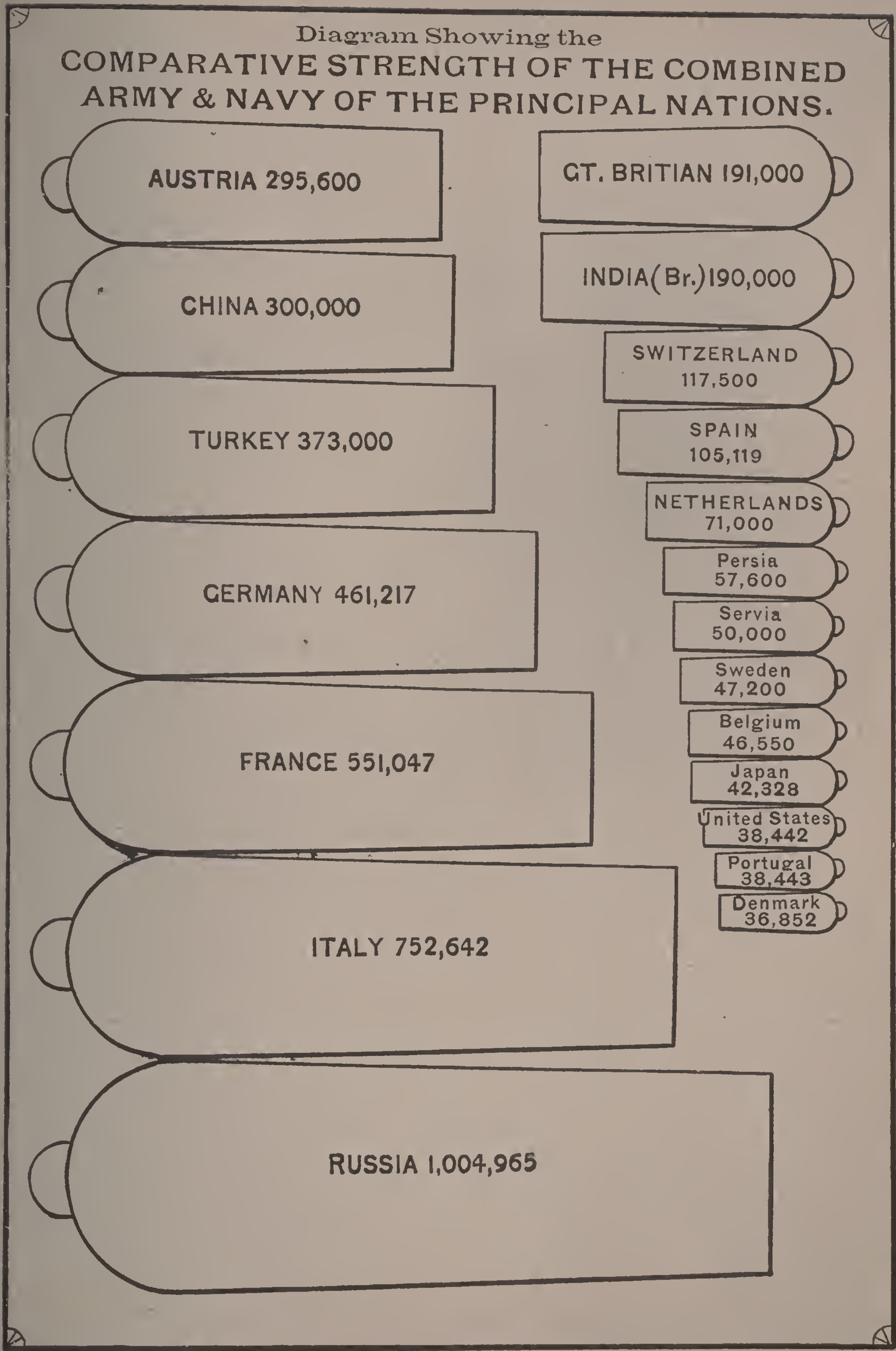


Diagram Showing the
COMPARATIVE STRENGTH OF THE COMBINED ARMY & NAVY OF THE PRINCIPAL NATIONS.
AUSTRIA 295,600
GT. BRITIAN 191,000
CHINA 300,000
INDIA (Br.) 190,000
SWITZERLAND 117,500
SPAIN 105,119
TURKEY 373,000
NETHERLANDS 71,000
Persia 57,600
GERMANY 461,217
Servia 50,000
Sweden 47,200
Belgium 46,550
FRANCE 551,047
Japan 42,328
United States 38,442
Portugal 38,443
Denmark 36,852
ITALY 752,642
RUSSIA 1,004,965

the men who work it, and sufficient horses are supplied to enable them to proceed at a gallop.

A Regiment of Cavalry consists of twelve troops of mounted soldiers, each of which contains not more than 78 enlisted privates, the maximum strength is therefore 936.

A Regiment of Infantry contains 10 companies, and each company consists of from 50 to 100 privates, as the needs of the service may require. Two of the 25 regiments of infantry consist of colored men. The maximum number of enlisted men cannot at any time exceed 30,000.

THE QUARTERMASTER'S DEPARTMENT purchases and distributes to the army all military stores and supplies requisite for its use, which other corps are not legally required to provide; to furnish means of transportation for the army, and its military stores and supplies; and to provide for and pay for all incidental expenses of the military service, except as the law directs other corps so to provide.

THE SUBSISTENCE DEPARTMENT is administered by picked subordinate officers, whose duty it is to receive at each military post the subsistence supplies of the army, and to purchase and issue to the army such provisions as may be required for the rations of the army.

THE CORPS OF ENGINEERS fulfill the important military duty of regulating and determining, with the approval of the Secretary of War, the number, form, dimensions and quality of all necessary vehicles, pontoons, tools, implements, arms, and other supplies for the use of the battalion of military engineers. This battalion consists of five companies of enlisted privates of the first and second class. The maximum strength of each company is 64 of each class. The enlisted men are instructed in the duties of sappers, miners, and pontooners. Engineers cannot be ordered on any duty beyond the line of their immediate profession except by the order of the commander-in-chief, the President of the United States.

UPON THE ORDNANCE DEPARTMENT devolves the important

duty of enlisting under the direction of the Secretary of War, master-armorers, master-carriage makers, and master-blacksmiths, who are mustered in as sergeants; subordinate armorers, carriage makers and blacksmiths, who are mustered as corporals; artificers, who rank as privates of the first class; and laborers as privates of the second class. The chief of ordnance organizes and details to other military organizations or garrisons such numbers of ordnance enlisted men, furnished with proper tools, carriages and apparatus as may be required, and makes regulations for their government; he also furnishes estimates, and, under the orders of the Secretary of War, makes contracts and purchases, for procuring the necessary supplies of ordnance and ordnance stores for the use of the United States army; he directs the inspection and proving of the same, and the construction of all cannon and carriages and all necessary implements; he establishes ordnance stores in such parts of the United States as may be deemed expedient; he executes all orders of the Secretary of War, and half-yearly, or oftener if required, he makes a report to the Secretary of War of all the officers and enlisted men in his department, and of all ordnance and ordnance stores under his command.

THE ARMY MEDICAL DEPARTMENT supplies medical or surgical aid to members of the army; has control of the purchase and distribution of medical supplies; unites with the officers of the army in superintending the cooking done by the enlisted men; attends, under the direction of the surgeon-general, to the proper preparation of the rations for the enlisted men; provides such quantities of preserved fruits, milk, butter and eggs as may be requisite for the proper diet of the sick in hospitals, and trusses for ruptured soldiers or pensioners.

THE PAY DEPARTMENT is charged with the punctual payment of the troops. The paymaster-general is the President, and he engages as many assistant paymasters as may be requested for the prompt discharge of this duty.

THE BUREAU OF MILITARY JUSTICE has entire control of the

proceedings of courts-martial, courts of military inquiry, military commissions, etc.

THE CORPS OF MILITARY CADETS consists of one from each congressional district in the United States; one from each territory; one from the District of Columbia, and ten from the United States at large. The cadets receive their appointment from the President. Cadets are required to be between seventeen and twenty-two years of age, and when any cadet has gone through the military classes of the Academy at West Point he becomes an eligible candidate for a position in any part of the army.

PAY OF PRINCIPAL OFFICERS OF THE ARMY.

The General of the Army per annum . . .	$13,500
The General's staff consists of six aids, who rank as Colonels of Cavalry, and receive in addition to forage for two horses per annum . . .	3,500
The Lieutenant-General per annum . . .	11,000
The Lieutenant-General's staff comprises two aids and a Military Secretary, who rank as Lieutenant-Colonels of Cavalry, and receive forage for two horses and per annum	3,000
Three Major-Generals, forage for five horses each and per annum	7,500
Each Major-General is entitled to three aids, who receive $200 per annum in addition to their pay as Captains or Lieutenants.	
Six Brigadier-Generals per annum	5,500
A Brigadier-General is allowed two aids who rank as Lieutenants, and claims forage for four horses.	
Colonels, forage for two horses, and per annum . .	3,500
Lieutenant-Colonels, forage for two horses, and per annum	3,000
Majors, forage for two horses, and per annum .	2,500
Captains, mounted, forage for two horses, and per annum	2,000
Captains, not mounted, per annum	1,800

Adjutants, forage for two horses, and per annum .	1,800
Regimental Quartermasters, forage for two horses and per annum	1,800
First Lieutenants, mounted, forage for two horses and per annum	1,600
First Lieutenants, not mounted, per annum . .	1,500
Second Lieutenants, mounted, forage for two horses and per annum	1,500
Second Lieutenants, not mounted, per annum .	1,400
Chaplains, forage for two horses and per annum .	1,500
Acting-Assistant Commissaries, $100 per annum in addition to the pay of their rank.	
Ordnance Storekeeper and Paymaster at the Springfield (Mass.) Armory, forage for two horses and per annum	2,500
Storekeepers, forage for two horses and per annum .	2,000

Every commissioned officer below the rank of brigadier-general, including chaplains and others, whose rank or pay assimilates, are allowed ten per cent of their annual pay for each term of five years of service.

Paymasters, when drawn from the civil service or commerce, are paid a salary of $1,200 per annum.

Hospital stewards of the 1st class, $30 per month.

Hospital stewards of the 2d class, $22 per month.

Hospital stewards of the 3d class, $20 per month.

Hospital matrons, one military ration and $10 per month.
Hospital nurses, one military ration and 40 cents per day.

Occasional extra services performed by non-commissioned officers entitle them to additional pay proportioned to service rendered.

PAY OF ENLISTED MEN IN THE UNITED STATES ARMY.

First terms of enlistment:

Sergeant-Majors and Quartermaster Sergeants of Cavalry, Artillery and Infantry, per month . . .	$23

Chief trumpeters of Cavalry and principal musicians of artillery and infantry, per month	$22
Chief Musicians of regiments, allowances of a Quartermaster Sergeant and per month	60
Saddler Sergeants of Cavalry and First Sergeants of Cavalry, Artillery and Infantry, per month . .	22
Sergeants of each force, per month	17
Corporals, Saddlers, Farriers and Blacksmiths, per month	15
Trumpeters, Musicians and Privates, per month . .	13
Sergeant-Majors of Engineers and Quartermaster Sergeants of Engineers, per month	36
Sergeants of Engineers and Ordnance, per month . .	34
First-class Privates of Engineers and Ordnance, per month	17
Musicians and 2d-class Privates of Engineers, per month	13

These rates of pay are increased by the addition of $1 per month for the third year, the fourth year and the fifth year, making $3 per month increase for the last year of service; but these increases are not paid until the soldier's term is ended, and if he misconducts himself previous to his discharge, the whole amount of "retained pay" is subject to forfeit. Privates may earn additional pay for extra service.

The *Pay Department* of the Navy is conducted by a corps of 13 pay-directors, 13 pay-inspectors, 50 paymasters and 50 assistant-paymasters.

The same limits of age are observed in this department as for staff officers. The physical, mental and moral qualities of all candidates must be tested and approved by a board of paymasters. All appointments to this corps are made by the President, and he also appoints one to every fleet or squadron, who is recognized as the "Paymaster of the Fleet."

The *Engineer Corps* of the Navy consists of 75 engineers, divided into three grades: 10 rank as captains, 15 as commanders, 45 as lieutenant-commanders or lieutenants. One selected by the President is the "Engineer of the Fleet." There are also 100 first-assistant engineers who rank as lieutenants;

and 100 second-assistant engineers who rank as masters or ensigns.

Twenty-four Chaplains are appointed by the President. The minimum age for this service is, at time of appointment, 21 years, and the maximum, 35 years. No restrictions of form or creed are imposed upon these naval ministers.

Professors of Mathematics to the number of 12 may be appointed to the Navy by the President. Three rank as captains, four as commanders, five as lieutenant-commanders. Their services may be required in ships of war, at the naval observatory, or at the naval academy.

Naval constructors, storekeepers, are selected and receive appointment by the President as the exigencies of the service may demand.

THE NAVY OF THE UNITED STATES.

The Secretary of the Navy is an important member of the President's Cabinet. Eight Naval Bureaus have been duly authorized, to which the whole of the arrangements of the Naval Departments have been assigned, namely:

The Bureau of Yards and Docks;
The Bureau of Equipment and Recruiting;
The Bureau of Navigation;
The Bureau of Ordnance;
The Bureau of Construction and Repair;
The Bureau of Steam-Engineering;
The Bureau of Provisions and Clothing;
The Bureau of Medicine and Surgery.

The first five of these Bureaus are presided over by a specially selected skilled naval officer; the sixth by a distinguished naval engineer; the seventh by a well-proved paymaster of the navy; and the eighth by an eminent surgeon of the navy. The chiefs of Bureaus are appointed by the President; receive the pay pertaining to their station in the navy, and continue in office for a term of four years.

The Hydrographic Office is a department of the Bureau of Navigation. The special duty assigned to this office is to provide accurate and inexpensive nautical charts, sailing directions, navigators, and manuals of instruction for the use of vessels of the navy and merchant marine. Greater safety and economy are thus ensured.

Nautical Observations are regularly made at the Naval Observatory at Washington; these are published, together with the astronomical observations, in the "Nautical Almanac," which is revised annually by a naval officer or naval professor of mathematics specially appointed by the Secretary of War. The observatory is in charge of a naval officer, who receives only the salary to which his rank entitles him.

The meridian of the naval observatory at Washington is recognized as the American meridian for all astronomical purposes; and for all nautical observations the meridian of Greenwich, England, is still preserved.

OFFICERS OF THE UNITED STATES NAVY.

The officers of the United States Navy on active service are as follows: 1 Admiral, 1 Vice-Admiral, 10 Rear-Admirals, 25 Commodores, 50 Captains, 90 Commanders, 80 Lieutenant-Commanders, 280 Lieutenants, 100 Masters, 100 Ensigns and Midshipmen.

The list of officers in the *Medical Corps of the Navy* is as follows: 15 each Medical Directors and Medical Inspectors, 50 Surgeons and 100 Assistant-Surgeons. The President bestows every appointment to the Medical Naval Staff, but no person can receive any appointment unless he has been examined and approved by the examining board of Naval Surgeons. Twenty-one years of age is the minimum and 26 years the maximum appointed for candidates for this service. The surgeons are selected by the President, and he appoints to every fleet or squadron a surgeon of the Flag-Ship with the title "Surgeon of the Fleet."

REVENUE AND EXPENDITURE.

The revenue of the United States is mainly derived from two sources, viz. duties on imports, and internal revenue taxes on distilled spirits, fermented liquors, tobacco, banks and banking. The natural expenditure is mainly on account of the war, and navy departments, pensions, payment of interest on the public debt, and the civil service.

Table (year ending June 30) from 1876 to 1885.

REVENUES.	EXPENDITURE.
1876—290,066,584	265,101,084
1877—269,000,586	238,660,008
1878—257,763,878	236,964,326
1879—273,827,184	266,947,883
1880—333,526,610	267,642,957
1881—360,782,293	260,712,888
1882—403,525,250	257,981,439
1883—398,287,582	265,408,137
1884—348,519,869	244,126,244
1885—323,690,706	260,226,395

These figures are exclusive of loans in the revenue and expenditure other than interest and premiums in connection with the public debt.

REVENUE AND EXPENDITURE FOR 1885.

Customs	$181,471,939	Civil expenses	$23,826,942
Internal Revenue	112,498,726	Foreign intercourse	5,439,609
Tax on National Banks	2,914,222	Indians	6,552,495
Other sources of revenue	26,804,813	Pensions	56,102,268
		Military Establishment	42,670,578
	$323,690,706	Naval Establishment	16,021,080
	305,830,970	Public buildings, collecting revenue, etc.	54,728,056
Surplus	$ 17,859,736	District of Columbia	3,499,651
		Interest on public debt	51,386,256
		Sinking Fund	45,604,035
			$305,830,970

It will be observed that *Pensions* form the largest item of expenditure.

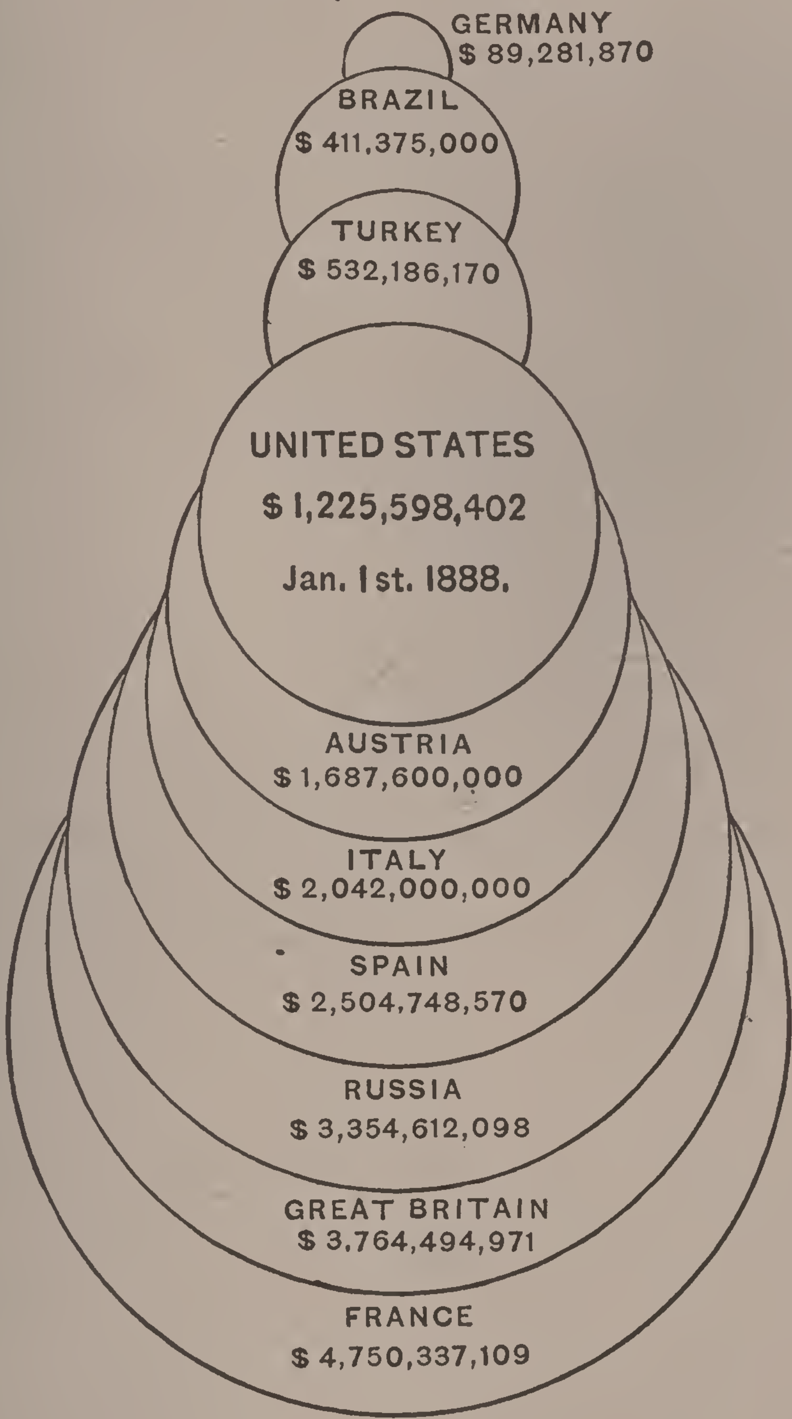
THE NATIONAL DEBT.

On November 1, 1885, the national debt amounted to $1,303,

Comparative Diagram Showing

THE NATIONAL PUBLIC DEBTS

OF THE PRINCIPAL COUNTRIES



034,056 (but at this date, 1888, it amounts to little over one billion); the United States were also liable for $64,623,512 bonds issued to the Pacific railways, which pay over five per cent of their net earnings to the government. The bulk of the debt was originally contracted at 6 and 5 per cent, but more than half of the interest-bearing debt is now at 4 per cent and the rest at 3, 3½, and 4½ per cent.

In 1883 the local debts in nearly all the states reached the total of $263,888,353.

VALUE OF PRODUCTS.

The total value of the products of agriculture, manufactures, mining, forestry and fisheries in the United States for the year ending June 30, 1883, was estimated in round figures at $10,000,-000,000.

CRIMINALS AND PAUPERS.

In 1880 there were 59,225 criminals in prison, of whom 5,069 were women.

The various states have poor-laws, but statistics are only kept of indoor paupers, of whom in 1880 there were 67,067.

The assessed value of real property in the United States in 1880 was $13,036,766,925, and of personal property, $3,866,-226,618.

EMPLOYMENT AND WAGES IN U. S. FACTORIES.

In 1880 there were employed in the various manufactories of the United States, 2,738,930 hands. The total amount of wages paid during the year was $947,919,674, being an average of over $350 per hand, whether retained or discharged. Value of manufacturing products, $5,000,000,000.

CHAPTER VII.

POSTAL ARRANGEMENTS OF THE UNITED STATES

THE POSTMASTER-GENERAL is appointed by the President, and his term of office is co-terminous with the presidency.

Three Assistant Postmasters-General are required by this important department of executive government; they are appointed by the President.

An Assistant Attorney-General is appointed by the Postmaster-General for the service of the Post-office Department.

An oath of fidelity is required of all persons entering this service.

The great responsibilities of the Postmaster-General involve a vast diversity of duties, the details of which are mainly interesting to himself, but the pivot of the whole system is the *skillful division of labor,* and the thorough supervision of every department. In Chicago and other large cities five divisions include all the operations of the Postoffice Department.

THE EXECUTIVE DEPARTMENT. The Assistant Postmaster, the Auditor of Postoffice Accounts, the book-keeper, the cashier and the watchmen are responsible for the duties of this department.

THE MAILING DEPARTMENT. The receipt and dispatch of all mail-matter passing through the office comprise the duties of the officers of this branch.

THE DELIVERY DEPARTMENT is devoted to the delivering of

all mail-matter by the free delivery, the box delivery, the letter carriers, etc.

THE REGISTERED-LETTER DEPARTMENT is invaluable for the registry of all letters and parcels containing valuables, and the conveyance and delivery of the same to persons fully authorized to receive them.

The Money Order Department issues money orders upon any postoffice in the United States and some foreign countries, and money orders received are cashed for any one entitled to receive payment.

Special Agents of the Postoffice Department are employed to superintend the Railway Postal Service, and the Free-Delivery and Money-Order Departments of the service.

The Postoffice Stamp Department comprises arrangements for wholesale and retail operations. Merchants and others buy stamps by the sheet or in greater quantities, stamped envelopes and postal cards by the hundreds. In the retail department sales extend from a one-cent stamp to a dozen or more of any required value.

All letters properly stamped and addressed are sorted and distributed as promptly as possible by a large staff of sorters and carriers.

All letters insufficiently stamped or inaccurately addressed, or left unclaimed in the General Delivery Department after being duly advertised are sent to the Dead-Letter Office of the Postoffice Department at Washington. If the address of the sender is ascertained, letters, etc., are returned to them.

Registered Letters incur a fee of 10 cents in addition to the ordinary postage.

A receipt for the registered letter is always given to the person registering.

Money Orders for any part of the United States are limited to the amount of $100, and no one person or firm can send more than three orders amounting to $100 each to the same person or firm in any one day. Money orders are payable only to the persons

in whose name they are drawn; but the right to collect the amount may be transferred by the drawee, by writing on the money order itself the name of the receiver. This can only be done by the person in whose favor the order is originally drawn.

After a money order has been issued, if the purchaser desires to have it modified or changed, the postmaster who issued it can take it back, and issue a new one, for which a new fee has to be paid.

RATES OF POSTAGE.

Letters.—Prepaid by stamps, 2 cents each ounce or fraction thereof to all parts of the United States and Canada; forwarded to another postoffice without charge on request of the person addressed; if not called for, returned to the writer free, if indorsed with that request. If the stamp is omitted the letter is forwarded to the Dead Letter Office, and returned to the writer. For registering letters the charge is 10 cents additional. Drop letters at letter-carrier offices, 2 cents per ounce or fraction thereof; at other offices, 1 cent per ounce or fraction thereof. On insufficiently prepaid matter mailed in Canada, 3 cents per ½ ounce or fraction thereof. Stamped postal cards, furnished only by government, 1 cent each; if anything except a printed address slip is pasted on a postal card, or anything but the address written on the face, letter postage is charged. Postage on all newspapers and periodicals sent from newspaper offices to any part of the United States, to regular subscribers, must be paid in advance at the office of mailing.

Second-Class Matter.—Periodicals issued at regular intervals, at least four times a year, and having a regular list of subscribers, with supplement, sample copies, 1 cent a pound; periodicals, other than weekly, if delivered by letter-carrier, 1 cent each; if over 2 ounces, 2 cents each. When sent by other than publishers, for 4 ounces or less, 1 cent.

Third-Class Matter (not exceeding 4 pounds).—Printed matter, books, proof-sheets, corrected or uncorrected, unsealed

circulars, inclosed so as to admit of easy inspection without cutting cords or wrapper, 1 cent for each 2 ounces.

Fourth-Class Matter.—Not exceeding 4 pounds, embracing merchandise and samples, excluding liquids, poisons, greasy, inflammable, or explosive articles, live animals, insects, etc., 1 cent an ounce. Postage to Canada and British North American states, 2 cents per ounce; must be prepaid; otherwise 6 cents.

Postage Rates to Foreign Countries.—To the countries and colonies which, with the United States, comprise the Universal Postal Union, the rates of postage are as follows: Letters, per 15 grams (½ ounce), prepayment optional, 5 cents; postal cards, each, 2 cents; newspapers and other printed matter, per 2 ounces, 1 cent. Commercial papers — First 10 ounces or fraction thereof, 5 cents; every additional 2 ounces, 1 cent. Sample of merchandise — First 4 ounces, 2 cents; every additional 2 ounces, 1 cent. Registration fee on letters or other articles, 10 cents. All correspondence other than letters must be prepaid at least partially.

Printed matter other than books received in the mails from abroad under the provisions of postal treaties or conventions is free from customs duty.

Dutiable books forwarded to the United States from the Postal Union are delivered to addresses at postoffices of destination upon payment of the duties levied thereon.

Postal Money Orders.—The limit of a single money order is \$100, instead of \$50, as formerly. The fees charged are as follows:

	Cents.
For orders not exceeding \$10	8
For orders from \$10 to \$15	10
For orders from \$15 to \$30	15
For orders from \$30 to \$40	20
For orders from \$40 to \$50	25
For orders from \$50 to \$60	30

	Cents.
For orders from \$60 to \$70	35
For orders from \$70 to \$80	40
For orders from \$80 to \$100	45

To Switzerland, Germany, Belgium, Portugal, Canada, Newfoundland, Italy, France, Algeria, New South Wales, Victoria, Tasmania, New Zealand, Jamaica: Fees, for not exceeding \$10, 15 cents; \$10 to \$20, 30 cents; \$20 to \$30, 45 cents; \$30 to \$40, 60 cents; \$40 to \$50, 75 cents. To Great Britain and Ireland and adjacent islands: Fees, for not exceeding \$10, 25 cents; \$10 to \$20, 50 cents; \$20 to \$30, 70 cents; \$30 to \$40, 85 cents; \$40 to \$50, \$1. To British India: Fees, for sums not exceeding \$10, 35 cents; not exceeding \$20, 70 cents; not exceeding \$30, \$1; not exceeding \$40, \$1.25; not exceeding \$50, \$1.50.

POSTAL RATES CHARGED BY CANADIAN GOVERNMENT, FOR DELIVERY IN CANADA, UNITED STATES, GREAT BRITAIN, ETC.

Letters to any place in Canada or the United States, for each half ounce or fraction thereof	3 cents
Letters for Newfoundland and Great Britain, for each half ounce or fraction thereof,	5 cents
City or drop letters,	1 cent
Postal cards for Canada and the United States,	1 cent
Postal cards for Great Britain,	2 cents
Books for Canada and the United States (limited 5 pounds) for each 4 ounces,	1 cent
Books for Great Britain, for each 2 ounces,	1 cent
Newspapers for Canada and the United States, for each 4 ounces,	1 cent
Newspapers for Great Britain, for each 2 ounces.	1 cent
Parcels for Canada only (limit 5 pounds) for each 4 ounces,	6 cents

Parcels for Manitoba limited to 2 pounds 3 ounces.

No parcels post for United States or Great Britain.

Samples, not exceeding 1½ pounds, to any part of Canada, for each 4 ounces, ... 4 cents

Samples for the United States, not exceeding 8 ounces, 8 cents

Samples for Great Britain, not exceeding 8 ounces, 2 cents for first 4 ounces, and 1 cent for each additional ounce.

REGISTRATION FEES CHARGED BY CANADIAN GOVERNMENT.

On letters for Canada, each, ...	2 cents
On letters for United States and Great Britain, each	5 cents
Parcels and samples for Canada, each . . .	5 cents
Books for Great Britain, each	5 cents

FOREIGN POSTAGE FROM CANADA.

Austria, Belgium, Denmark, Egypt, France, Germany, Gibraltar, Greece and Ionian Isles, Italy, Japan, Malta, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey: Letters, 5 cents each ½ ounce; postal cards, 3 cents each; books, 1 cent each 2 ounces; newspapers, 2 cents each 4 ounces; registration, 5 cents.

Australia, except Victoria, New South Wales and Queensland: Letters, 7 cents each ½ ounce; books, 3 cents each 2 ounces.

New Zealand, Victoria, New South Wales and Queensland: Letters, 15 cents each ½ ounce; newspapers, 4 cents each 4 ounce. Books, 6 cents each 2 ounces. Registration, 15 cents.

MONEY ORDERS ISSUED BY THE GOVERNMENT OF CANADA.

On orders payable within the Dominion—limit $100.

On orders up to $4.00	2 cts.	Over $40.00 up to $60.00	30 cts.
Over $4.00 up to $10.00	5 "	" 60.00 " 80.00	40 "
" 10.00 " 20.00	10 "	" 80.00 " 100.00	50 "
" 20.00 " 40.00	20 "		

On money orders payable in the United Kingdom, United

States, all Foreign Countries and British Possessions—limit of amount of any issue $50.

On orders up to	$10.00	10 cts.		Over $30.00	up to	$40.00	40 cts.
Over $10.00	up to 20.00	20 "		" 40.00	"	50.00	50 "
" 20.00	" 30.00	30 "					

USEFUL HINTS RELATING TO CORRESPONDENCE AND POSTAGE.

Be careful to give the name of the *town* and *state* in which you reside, at the top of the first page of your letter, or print it and your name on the outside of the envelope, that in case of non-delivery it may be returned to you from the Dead Letter Office, Washington, or the general office.

Give your name and address on the left-hand corner of books, parcels, etc., that they may be returned if not delivered.

State clearly and in full the name of the state as well as the town to which your mailed matter is addressed. This facilitates prompt and sure delivery.

Always write "transient" or "General Delivery" on mailed matter addressed to persons not residing where you forward to them.

Register all letters and packages containing valuables. The fee for registration is only ten cents, which with the postage must be fully prepaid. The name and address of the sender must be written on the outside of the envelope or wrapper of all registered letters and packages. This insures the utmost attainable certainty of the safe delivery of such letters, etc.

In sending postal cards be careful to write nothing more than the name and address of the person to whom you send it, on the stamped side. If this rule is not observed or anything is attached to the postal card letter postage will be charged.

All manuscripts for magazines, periodicals and newspapers, and all music and book manuscript must be enclosed with proof-sheets of the same or be certified as MSS. for printer only, with your name and address, or they will be charged full letter rates. As MSS. they cost only one cent for each two ounces.

The safety of the P. O. service requires the recognition of the rule "that no poisons, liquids, inflammable and explosive articles, fatty substances easily liquefiable, insects (except queen bees), live or dead animals not stuffed, reptiles, confectionery, paste or confections, fruits or vegetable matter, and substances exhaling a bad odor, must not be sent by mail."

Equally important is the moral rule "that no post-card and no letter upon the envelope of which obscene, lewd, indecent or lascivious drawings, terms, epithets, or language may be written or printed, and no matter containing lotteries, so-called gift concerts or other similar enterprises, offering prizes, or concerning schemes devised and intended to defraud the public, or for the purpose of obtaining money or goods under false pretenses, shall in any case be transmitted by mail in the United States of America."

All mail-matter of any sort, either domestic or foreign, lost in transmission, should be inquired for as soon as the loss is known, in order that any dishonest practices may be traced and checked. Inquiries should be addressed to the chief inspector, Postoffice department, Washington, D. C.

Inquiries relating to mail-matter known to have been sent to the Dead Letter Office, Washington, may be addressed to the third assistant postmaster-general.

In all letters of inquiry for lost mailed matter the fullest possible particulars must be given; the name and address of the writer and sender; the place and time at which the matter was mailed; and a full description of the contents. If it is known when or why the matter was sent to the Dead Letter Office this also should be stated. In the event of the loss of any registered mail-matter the number of the register should be given; for this reason it is important to keep the receipt for registration.

All first-class matter, when one full rate postage fee has been prepaid, and all other matter when fully prepaid, may, at the request of the person to whom it is addressed, be forwarded, from one postoffice to another. Postmasters can return or for-

ward second, third and fourth class mail-matters only when a sufficient amount is forwarded to pay the postage fees for re-mailing. A printed or written request on such mail-matter asking postmasters to notify senders of non-delivery of the same and the amount required for re-mailing will be duly answered.

Good envelopes should be used for all mailed letters, as the thin, poor quality envelopes often split, and excite unjust suspicions against the postoffice employés.

Prepayment of one full rate of postage on first-class matter will insure its transmission ; any deficiency on postal rate will be collected from the receiver. All other matter must be fully prepaid or it will not be forwarded.

ITEMS CONCERNING POSTOFFICES AND LETTERS.

Postoffices were first established in A.D. 1464 ; the growth of this institution has been so great and rapid that the following figures represent the present facts with regard to the people who write and receive letters:

Australians receive more letters and post-cards than any other people, the annual average being twenty-four to each person. Europeans come next with about fourteen each. An Asiatic gets only 40-100 of a letter or post-card, and an African only 9-100. In Europe there were mailed in 1885, 3,894,100,000 letters and 597,500,000 post-cards, in America 1,596,800,000 letters and 398,000,000 post-cards, in Asia 246,000,000 letters and 80,000,000 post-cards, in Australia 93,400,000 letters and 1,200,000 post-cards, and in Africa 18,700,000 letters and 300,000 post-cards. The total number of pieces of matter mailed in Europe in 1885 was 7,249,300,000, in America 3,819,000,000, in Asia 389,600 000, in Australia 151,400,000, and in Africa 30,700,000.

THE UNITED STATES MINT.

The first building erected in the United States for public use under the authority of the federal government, was a structure for the United States Mint. This was a plain brick edifice,

on the east side of Seventh street, near Arch, Philadelphia. The Mint was established by act of Congress in 1792, and the corner-stone was laid on July 31 of that year. The building was occupied for about forty years, and in 1829 an act was passed locating the Mint on its present site in Chestnut street.

The first coinage of the United States was silver half dimes in October, 1792, of which Washington makes mention in his address to Congress in November of that year. The first metal purchased for coinage was six pounds of old copper at one shilling and three pence a pound, which was coined and delivered to the treasurer in 1793. The first deposit of silver bullion was made on July 18, 1794, by the bank of Maryland. It consisted of "coins of France" amounting to $80,715.73½. The first deposit of gold bullion for coinage was made by Moses Brown, merchant, Boston, on February 12,1795; it was of gold ingots, worth $2,276.72, and was paid for in silver coins. The first return of gold coinage was on July 31, 1795, and consisted of 744 half eagles. The first delivery of eagles was on September 22 same year, and consisted of 400 pieces.

The coinage up to the end of the year 1800 may be stated in round numbers at $2,534,000; that of the decade ending with 1810 amounted to $6,971,000; and within the ten years ending 1820, $9,380,000; 1830, $18,000,000. The coinage for the fiscal year ending June 30, 1884, was gold coinage, $27,932,824. 00; silver coinage, $28,108,227.00.

The coin in circulation in the United States in 1884 was estimated at, gold $552,000,000; silver, $250,000,000. The net gain to the coin circulation was $14,000,000 in gold, and $22,000,000 in silver. The total amount coined at the different mints and assay offices was $5,433,102.64 and the total expenditures, and losses of all kinds amounted to $1,676,002.73. The deposits and purchases of gold and silver bullion at the Philadelphia mint amounted to $16,802,750.40.

HISTORY OF THE TRADE DOLLAR.

The coinage of the trade dollar was authorized by act of

Congress February 12, 1873, and was not intended for circulation in the United States, but for export to China. It was designed to compete with the Spanish and Mexican dollar. That empire having no mint for the coinage of gold and silver, depended upon foreign coin for it domestic circulation, and until the institution of the trade dollar the principal shipments of coin to China were in the form of Mexican dollars.

The trade dollar was made a little more valuable than the American and Mexican dollar, thus not only affording a market for the surplus silver of the mines of the Pacific coast, but furnishing merchants and importers from China with silver in a convenient form for payment for commodities, instead of their being obliged to purchase Mexican dollars for that purpose.

Until 1876 it was a legal tender to the amount of five dollars, but in that year this was repealed.

THE STANDARD SILVER DOLLAR.

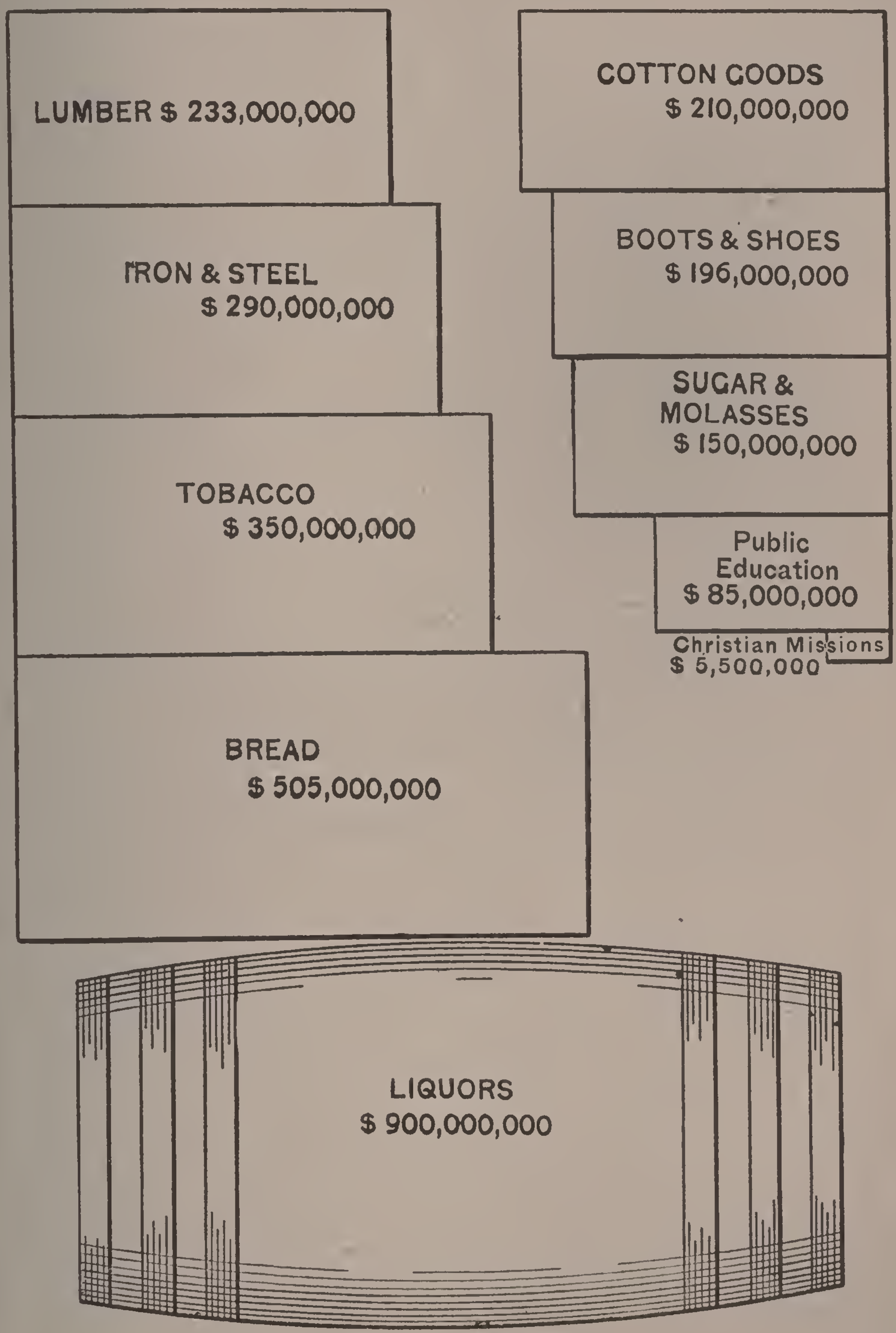
Its coinage was authorized, April 2, 1792. Weight 416 grains, standard silver; fineness 892.4. Weight changed January 18, 1837, to 412½ grains; fineness 900. Coinage discontinued Act February 12, 1873. Coinage revived, Act February 28, 1878, two million dollars per month required to be coined, and issue made legal for all debts, public and private.

The dollar did not originate with the Spanish, but was first coined at Joachinsthal, a mining town in Bohemia.

THE CABINET FOR COINS AND RELICS.

The cabinet of the Mint contains a wonderful and most interesting collection. Here are the standard test-scales, used to test the weights sent to all the mints and assay offices in the United States. They are exact to the *twenty thousandth* part of an ounce. Among the curiosities are three images of pure gold from graves in the Island of Chirique, off Central America. There is a choice selection of mineral specimens; and a collection of ancient and modern coins of all lands. One of the most valuable coins is the silver dollar of 1804. It is said that the

HOW WE SPEND OUR MONEY.
AN INSTRUCTIVE DIAGRAM.



scarcity of this dollar is due to the sinking of a China-bound vessel, containing almost the entire mintage of that year, in lieu of Spanish milied dollars. It is believed that not more, or possibly eight genuine 1804 dollars, are extant.

VISITING THE MINT.

The Mint is open to the public daily, Sundays and holidays excepted, from 9 to 12 A.M. Visitors are met by courteous ushers, who attend them through the various departments.

STANDARD WEIGHTS.

The earliest series of standard weights known are two sets discovered by Mr. Layard in the ruins of Nineveh. They are now in the British Museum. The old Saxon pound was the earliest standard in England. It was identical in weight with the old apothecaries' pound of Germany and equal to 5,400 of our later troy grains. The pound sterling was determined from this weight in silver. The idea of the *grain* was borrowed by the English from the French. The Black Prince brought back with him from France the pound Troye, which was derived from the commercial town of that name. Troy weight was adopted by druggists and jewelers for its convenient reduction into grains.

The pound avoirdupois (French avoir-du-poids, "to have weight") equals 7,000 grains troy. In 1834, the English standards of weight and measure, consisting of a yard and pound troy of brass, were destroyed by fire at the burning of the Houses of Parliament. The unit of weight in the United States is a troy pound weight, obtained from England, a duplicate of the original standard fixed by the commission of 1858, and reasserted by the commission in 1838. It is a bronze of 5,760 grains troy, in a strong safe in the United States Mint in Philadelphia. All of the scales and delicate test instruments in use by the government are manufactured in this country.

VALUES OF FOREIGN COINS IN UNITED STATES MONEY.

Country.	Monetary Unit.	Standard.	Value in U. S. Money.	Standard Coin.
Argentine Republic	Peso	Gold and Silver	$ 96.5	1-20, 1-10, 1-5, ½ and 1 Peso, ½ Argentine and Argentine
Austria	Florin	Silver	39.3	....
Belgium	Franc	Gold and Silver	19.3	5, 10, and 20 francs.
Bolivia	Boliviano	Silver	79.5	Boliviano.
Brazil	Milreis of 100 of Reis	Gold	54.6	....
British Possessions in N. A.	Dollar	Gold	1.00	....
Chili	Peso	Gold and Silver	91.2	Condor, Doubloon and Escudo.
Cuba	Peso	Gold and Silver	93.2	1-16, ⅛, ¼, ½ and 1 Doubloon.
Denmark	Crown	Gold	26.8	10 and 20 Crowns.
Ecuador	Peso	Silver	79.5	Peso.
Egypt	Piaster	Gold	04.9	5, 10, 25, 50 and 100 Piasters.
France	Franc	Gold and Silver	19.3	5, 10 and 20 Francs.
German Empire	Mark	Gold	23.8	5, 10 and 20 Marks.
Great Britain	Pound Sterling	Gold	4.86.6½	½ Sovereign and Sovereign.
Greece	Drachma	Gold and Silver	19.3	5, 10, 20, 50 and 100 Drachmas.
Hayti	Gourde	Gold and Silver	96.5	1, 2, 5, and 10 Gourdes.
India	Rupee of 16 Anas	Silver	37.8	....
Italy	Lira	Gold and Silver	19.3	5, 10, 20, 50 and 100 Lire.
Japan	Yen	Silver	85.8	1, 2, 5, 10 and 20 yeu, gold and silver yeu.
Liberia	Dollar	Gold	1.00	....
Mexico	Dollar	Silver	86.4	Peso or Dollar, 5, 10, 25, 50 Centavo.
Netherland	Florin	Gold and Silver	40.2	....
Norway	Crown	Gold	26.8	10 and 20 Crowns.
Peru	Sol	Silver	79.5	Sol.
Portugal	Milreis of 1,000 Reis	Gold	1.08	2, 5, and 10 Milreis.
Russia	Rouble of 1000 Copecks	Silver	63.6	¼, ½ and 1 Rouble.
Spain	Peseta of 100 Centimes	Gold and Silver	19.3	5, 10, 20, 50, and 100 Pesetas.
Sweden	Crown	Gold	26.8	10 and 20 Crowns.
Switzerland	Franc	Gold and Silver	19.3	5, 10, and 20 Francs.
Tripoli	Mahbul of 20 piasters	Silver	71.7	....
Turkey	Piaster	Gold	04.4	25, 50, 100, 250, and 500 Piasters.
United States of Colombia	Peso	Silver	79.5	Peso.
Venezuela	Bolivar	Gold and Silver	19.3	5, 10, 20, 50 and 100 Bolivar.

UNITED STATES BONDS.

Interest is calculated on United States bonds and on the public debt at 365 days to the year, and is due semi-annually.

By five-twenties is meant the 6 per cent gold-bearing bonds of the United States, which are to mature in twenty years, but which the government, by giving due notice, can pay in gold any time after five years from date of issue.

The old five-twenties were the first issue. They bear date May 1, 1862, and are redeemable after May 1, 1867, and payable May 1, 1882. The new five-twenties were issued November 1, 1864, July 1, 1865 and November 1, 1865.

By ten-forties is meant the 5 per cent gold-bearing bonds which are to mature in forty years, but which may be paid by the government at any time after ten years.

By seven-thirties is meant a *currency* loan, which matures in three years, at which time they may be changed for the *five-twenty* 7 per cent bonds, bearing interest in gold. The name is derived from the rate of interest, it being 7.3 per cent. The "First Series" bear date August 15, 1864. The "Second Series" bear date June 15, 1865, and are convertible June 15, 1868. The "Third Series" bear date July 5, 1865. On this issue the government reserves the right to pay the interest at 6 per cent in gold, instead of 7.30 per cent in currency.

By six per cent of 1881 is meant the 6 per cent gold-bearing bonds, which cannot be increased by government, except by purchase, until after maturity.

CHAPTER VIII.

BRIEF BIOGRAPHIES OF THE PRESIDENTS OF THE UNITED STATES.

GEORGE WASHINGTON, first President, was born in Virginia, February 22, 1732; was appointed aide-de-camp to General Braddock in 1755, and shortly afterward Chief of the Forces of Virginia; was delegate to the congress of 1774; appointed Commander-in-Chief of the American armies 1775, a position which he retained throughout the War of Independence; was inaugurated President of the United States, April 30, 1789, and served two terms of four years each. He died at Mount Vernon, Va., December **14, 1799**, in his sixty-eighth year.

John Adams, second President, was born in the town of Barntree, now Quincy, Mass., October 30, 1735; he graduated at Harvard at the age of twenty, and afterward studied and practiced law successfully. Together with Thomas Jefferson he was appointed by the Continental Congress to draft the Declaration of Independence; was sent as delegate to France in 1777 and 1779, and Special Envoy to England in 1785. He was Vice-President during the entire Presidency of Washington, and succeeded him in the President's office. He died on July 4, 1826, in the ninetieth year of his age.

Thomas Jefferson, third President, was born in Albemarle county, Va., April 2, 1743. He studied at William and Mary College and graduated there, when he devoted himself to the legal profession. He was chosen a member of the Virginia Legislature in 1760, and, although a large slaveholder, introduced

a bill to legalize the manumission of slaves. He drafted the Declaration of Independence. He held the positions of Governor of Virginia, 1779; Minister to England, 1782; and Minister to France, 1784. He became Secretary of State in 1789, Vice-President, 1797, and was inaugurated as President in 1801, retaining that position for eight years. Died at Monticello, Va., July 4, 1826, aged eighty-three years.

James Madison, fourth President, was born in Orange county, Va., 1751. Graduated at Princeton College at the age of twenty. In 1776 he gave leading assistance in the Virginia Convention toward the framing of a State Constitution, and in 1780 he was sent as a delegate to the Continental Congress. He was a member of the National Convention to frame the United States Constitution in 1787; was Secretary of State during Jefferson's administration, and was inaugurated as President of the United States in 1809, serving two terms of four years each. Died June 28, 1836, aged eighty-five, at Montpelier, Va.

James Monroe, fifth President of the United States, was born in Westmoreland county, Va., April 28, 1758. Was two years at William and Mary College, after which, in his nineteenth year, he became a cadet in the army of Washington, was wounded at the battle of Trenton, and became successively captain and colonel. He was elected to the Virginia Assembly, was a member of the Executive Council, 1782, and was chosen delegate to the Continental Congress. He afterward held the positions of Minister to France, Governor of Virginia, and during the second term of Madison's administration, Secretary of State. He was inaugurated as President March 4, 1817, and served two terms. Died at New York City, July 4, 1831, aged seventy-two.

John Quincy Adams, sixth President, was born July 11, 1767, in Massachusetts. He graduated at Harvard College, afterward studying and practicing law. He was appointed Minister to the Netherlands in 1794, and Minister to Portugal in 1797.

He was chosen State Senator in 1802, and United States Senator in 1804. During his tenure of the latter office he became Professor of Rhetoric in Harvard College. In 1809 he became Minister to Russia and Minister to England in 1815. He was Secretary of State during the whole of Monroe's presidency. He was inaugurated as President of the United States March 4, 1825. Died of apoplexy in the House of Representatives at Washington, whilst addressing the Speaker, February, 21, 1848, aged eighty-one years.

Andrew Jackson, seventh President of the United States, was born in South Carolina in 1765. At the age of twenty he practiced law at Nashville, Tenn., and on the admission of Tennessee to the Union was elected Representative to Congress and afterward to the United States Senate. In 1798 he became Judge of the Supreme Court of Tennessee, but speedily resigned that office for that of Major-General of Militia. He had a successful military career, distinguishing himself in several campaigns against the Indians; defeating the British in Florida, and successfully and brilliantly defending New Orleans. He became Governor of Florida, and in 1823 United States Senator for that state. He served eight years as President, his inauguration taking place March 4, 1829. Died June 8, 1845, aged seventy-eight years.

Martin Van Buren, eighth President of the United States, was born in the state of New York in 1782. He commenced the study of law at the age of fourteen, and was admitted to the bar in his twenty-first year. He was State Senator in 1812, Attorney-General in 1818, United States Senator in 1821. reëlected, 1827, Governor of New York 1828, Secretary of State 1829. He was elected Vice-President of the United States in 1832, and held that office until his election to the presidency. Inaugurated March 4, 1837. He held the office one term. Died July 24, 1862, aged eighty years.

William Henry Harrison, ninth President, was born in Virginia, February 9, 1773. He graduated at Hampden Sidney College, and began the study of medicine, but relinquished it to

become ensign, at the age of nineteen, in the Army of the Western Frontier. He resigned his commission as captain in 1797 to become Secretary of the Northwestern Territory. In 1800 he was appointed Governor of Indian Territory and Upper Louisiana. His complete success in an action with the Indians at Tippecanoe river caused him to be appointed Commander-in-Chief of the Northwestern army. He was Representative to Congress for Ohio in 1816, elected to the Senate of Ohio 1819, United States Senator in 1824, and minister to Colombia in 1828. He was a candidate for President in 1836, but was defeated. He was, however, elected in 1840, and inaugurated March 4, 1841. He died exactly one month later, aged sixty-eight years.

John Tyler, the tenth President of the United States, succeeded to the position on the demise of Harrison, under whom he had been elected Vice-President, and held the presidency during the remainder of the term. He was born in Virginia 1790, and died January 18, 1862, aged seventy-two.

James K. Polk, the eleventh President, was born in North Carolina, November 2, 1795. Studied and practiced law in Columbia, Tenn., 1819; served in Legislature 1823; elected Member of Congress 1825, continuing in office for fourteen years. In 1845 he became Democratic candidate for the presidency and was elected. He was inaugurated March 4, 1846. He retired from office 1849, and died the same year, June 15, aged fifty-four years.

Zachary Taylor, twelfth President, was born November 24, 1784. He entered the United States army as lieutenant in 1808, and rose through the ranks of captain, major and colonel, to an independent command as general. His brilliant career in the war with Mexico led to his nomination to the presidency. He was inaugurated March 4, 1849. He died July 9, 1850, having been President one year, four months and five days, aged sixty-six.

Millard Fillmore, thirteenth President of the United States,

was born in Cayuga county, New York, January 7, 1800. He practiced law in the village of Auburn 1823; was elected member of the New York Legislature 1829; Representative in Congress 1835; reëlected 1837. In 1847 he was elected Comptroller of the State of New York. He was elected Vice-President in 1848, and on the death of President Tyler succeeded him in office, serving to the end of his term. Died March 8, 1874, aged seventy-four years.

Franklin Pierce, fourteenth President of the United States, was born in Hillsborough, N. C., November 23, 1804. He graduated at Bowdoin College and studied and practiced law. He was speedily sent to the State Legislature, and in 1833 was elected a member of Congress, in 1837 United States Senator, and in the Mexican war he was commissioned a Brigadier General. Notwithstanding numerous obstacles, he succeeded in joining General Scott at Puebla, with his troops, and was engaged actively in the closing scenes of the war. He was elected to the presidency by a large majority, and was inaugurated March 4, 1853. Died October 8, 1869, aged sixty-five years.

James Buchanan, fifteenth President of the United States, was born in Pennsylvania 1791. He followed the profession of the law with great success. He was a member of his native State Legislature for six years, and was elected five times successively to Congress. In 1831 he was appointed Minister to Russia ; in 1833 he was elected United States Senator. In 1845 he became Secretary of State. He was inaugurated as President March 4, 1857. Died June 1, 1868, aged seventy-seven years.

Abraham Lincoln, sixteenth President, was born in Kentucky 1809. He was very humbly born, his father being without the very elements of education, but he forced himself on, and by his own efforts acquired a good education. Such qualities necessarily brought him to the front, and he became a prominent lawyer and statesman. He took part in the Black Hawk war, in which he distinguished himself, was elected to the Illinois Legislature

in 1834 and reëlected 1836; he was a Representative to Congress 1847. His contest with Stephen A. Douglas, for the United States Senatorship, led to his nomination as President. He was inaugurated March 4, 1861. He was reëlected in 1864, but was assassinated by Booth at Ford's Theater Washington, D. C., April 14, 1865, aged fifty-six years.

Andrew Johnson, the seventeenth President of the United States, attained that position from the vice-presidency, which he occupied when Abraham Lincoln was assassinated. He was born in Raleigh, N. C., in 1808. At the age of ten he was apprenticed to a tailor, and served seven years, afterward working at the trade several years. He educated himself with his wife's assistance, and was elected Alderman of Greenville, Tenn., in 1828, Mayor in 1830; he was sent to the State Legislature in 1835, and in 1839, to Congress in 1843; he became Governor of Tennessee in 1853, and again in 1855, and United States Senator in 1857. He took the presidential chair April 15, 1865. In 1866 he was impeached by the House and tried by the Senate, but acquitted. After the close of his term he retired from public life until 1875, when he was elected United States Senator. He died July 31 of that year, aged sixty-seven years.

Ulysses S. Grant, eighteenth President of the United States, was born in Clermont county, Ohio, April 27, 1822. He entered the Military Academy at West Point in 1839, and graduated in 1843. In the war with Mexico he held the rank of Brevet Second Lieutenant, and was in every battle but that of Buena Vista. He was promoted to the rank of Captain. In 1854 he left the army and engaged unsuccessfully in farming and afterward in the leather trade. He was more than forty years of age when his life seemed that of a disappointed man. The war of the Rebellion, however, brought his opportunity. He began by showing that he could handle men, and secure their confidence, and he rose step by step until he was at the head of the entire Federal force. In 1867 he became for a short time Secretary of

War, and he was elected President in 1868 and reëlected in 1872. He died July 23, 1885, aged sixty-three years.

Rutherford B. Hayes, the nineteenth President of the United States, was born at Delaware, Ohio, October 4, 1822. He graduated at Kenyon College in 1842, and afterward studied law. He was admitted to the Bar in 1845; was commissioned Major in the army 1861. At the close of the Civil War, in which he was several times wounded, he became Brevet Major General. He was a member of Congress for Ohio in 1864 and was reëlected in 1866; Governor of Ohio in 1867, and reëlected 1869, and 1875. He was inaugurated as President March 4, 1877, and served the full term of four years.

James A. Garfield, twentieth President, was born in Cuyahoga county, Ohio, November 19, 1831. His parents were poor and he had a hard struggle in his youth. His career was the honorable one "from the log cabin to the White House." He graduated at Williams College, in 1856; in 1859 he was chosen a member of the Ohio Senate. In 1861 he became Colonel of the 42d Ohio Infantry, and his distinguished services advanced him to the rank of Major General. He retired from the army to reënter Congress, where he occupied a prominent place. There he continued until 1880, when he was sent to the United States Senate. On March 4, 1881, he was installed in the President's chair, but only occupied it for a few months. He was shot by the assassin Guiteau July 2, 1881, and died September 19, in the same year, aged fifty years.

Chester A. Arthur, twenty-first President of the United States, was born in Franklin county, Vt., October, 5, 1830. He graduated at Union College, Schenectady, N. Y., in 1849, and soon afterward became Principal of Pownal Academy, Vermont. He adopted the legal profession, and was sent as delegate to the Convention at Saratoga which founded the Republican party of New York. In 1860 he was appointed by Gov. Morgan of New York, Engineer-in-Chief on his staff, and afterward Quarter-

master-General of Military forces of New York. He was appointed Collector of Customs of the port of New York in 1871, and reappointed in 1875. He was elected Vice-President under President Garfield, and on the death of the latter, occupied his position by law. He held the office till the end of the term, March 4, 1885. After a long illness he died.

Grover Cleveland, twenty-second President of the United States, was born in Caldwell, N. J., March 18, 1837. Admitted to the bar 1859, he became Assistant District Attorney in the State of New York, and was reappointed in 1863. He was elected Sheriff of Erie county, 1863; Mayor of the City of Buffalo 1881; Governor of New York 1882. He was inaugurated President March 4, 1885.

CHAPTER IX.

PHYSICAL GEOGRAPHY.

STARTING from the sun, the earth is the third of the globes that is reached, which circle around it. The planet Mercury is the nearest to the sun, and is much smaller than the earth ; next is Venus, a globe nearly as large as the earth ; and then Earth, whilst fourth comes the planet Mars.

Our globe is about 7,900 miles in diameter. It is not a perfect sphere but is flattened at the poles, so that it resembles an orange in shape. The earth turns round once in 24 hours as if on a rod or axis, and this turning motion is called its daily or diurnal rotation. It is this motion which causes night to follow day and day to follow night. Every instant one half of the earth's surface is in sunlight and the other half in darkness ; the former half receiving supplies of warmth, the other half parting with the heat it had received during the day. Whilst, however, the dark half of the earth is absolutely without any direct supply of heat or light from the sun, *all over its extent*, the illuminated half is not in the same general condition all over its extent, but is receiving the largest supply of heat at or near its center, and scarcely any heat at or near its circumference.

The tropical zone includes all those parts of the earth at which the sun is ever overhead, and, except on the tropics themselves, the sun is overhead twice a year at every spot in the tropical zone. At the equator it is overhead at noon, in spring and autumn. North of the equator it is overhead first between

SCENE IN THE POLAR REGIONS.

spring and summer, and second, between summer and autumn, the times of the greatest midday heat being nearer to midsummer according as the place is nearer to the northern tropic. South of the equator the sun is overhead, at noon, between the southern spring and summer (which are our autumn and winter), and again overhead between the southern summer and autumn (our winter and spring), the times of greatest midday heat being nearer to the southern midsummer according as the place is nearer to the southern tropic.

The polar regions are called the *Frigid zones*, or the *Arctic regions*. The Arctic regions include all parts of the earth at which the sun ever continues for twenty-four hours above the horizon, or twenty-four hours below it. The spaces between the Arctic regions and the tropical zones are called the *Temperate zones.* In these zones the sun is never overhead, and is never either above or below the horizon for twenty-four successive hours.

The earth then is a globe always, only heated and illuminated over one-half; more heated and illuminated over the central parts of that half than elsewhere; so turning as at different seasons to cause different parts of her surface to occupy this region of greatest central light and heat.

The surface of the earth may be considered an enormous ocean, in which are three large islands and a number of smaller ones. The largest of these islands includes the continents of Europe, Asia and Africa. Of these Europe and Asia may be regarded as a single land-region, whilst Africa, which is only connected with Asia by the isthmus of Suez (now cut by the Suez canal), may fairly be looked upon as a separate continent. America, the second of the great continent-islands in point of size, is divided into two portions, which are in reality much more distinctly separated than Africa is from Asia; yet they are regarded as a single continent, being simply called North and South America. The extent of Australia, the third great island, is little less than that of Europe. Other important islands are Madagascar, Greenland, Iceland, Spitzbergen, Nova Zembla,

Great Britain, Ireland, Japan, Sumatra, Java, Borneo, Papua, Cuba, St. Domingo, Jamaica; the New Zealand islands, New Caledonia, and the islands of the Pacific ocean; the Mediterranean islands; Newfoundland.

The division of the water surface is to some extent arbitrary, since there is no real separation between the oceans. All the water within the Arctic circle forms the Arctic ocean; that within the Antarctic forms the Antarctic ocean. The water lying between America on the west and Europe and Africa on the east forms the Atlantic; the Indian ocean extends over the whole space between the Antarctic, the Atlantic, Africa, Arabia, nearer India, Borneo, Celebes, Papua and Australia to the circle marking 145 degrees of east longitude. The enormous expanse of water surface between America, Asia and Australia, but limited on the east, west and south by the Atlantic, Indian and Antarctic oceans, is called the Pacific. The Mediterranean, Black, Irish, North and Baltic seas, and the gulf of Mexico, are regarded by some geographers as belonging to the Atlantic. Inland seas (so called because they are salt) are the Caspian, sea of Aral, and Dead Sea, and a few others. True lakes, or fresh-water surfaces, are regarded as belonging to the land, since even the largest of them are in fact merely appendages of the river systems.

The sea-surface of the earth is nearly three times as great as the land-surface. If the latter be represented by 100, the former may be so by rather more than 280. The whole surface of the globe being 196,500,000 square miles, the land-surface is thus about 51,500,000, and the sea 145,000,000. The southern hemisphere contains a larger extent of sea-surface than the northern in the proportion of about 7 to 5; the land-surface in the northern hemisphere amounts to about 38,000,000 of square miles, and in the southern to about 13¼ millions.

SALTNESS OF THE SEA.

The sea is not equally salt in all places. Inland seas into

which large rivers fall are usually less salt than the open sea; but where such seas are exposed to great heat, and no large rivers fall into them, the water is often saltier than ordinary sea-water. Near the Polar seas the water is less salt than elsewhere owing to the meeting of the ice there. If the salt of a given quantity of water, from the British Channel, be called 100, then there is in the same quantity:

Baltic Sea, 19 parts of salt.
Black Sea, 61 parts of salt.
Irish Channel, 96 parts of salt.
Mediterranean Sea, 111 parts of salt.
Ocean of the Equator, 112 parts of salt.
North Atlantic, 116 parts of salt.
Sea of Marmora, 118 parts of salt.
South Atlantic, 121 parts of salt.
Dead Sea, 1806 parts of salt.

COLOR OF THE SEA.

The open sea is usually a deep blue, almost black-blue. Near the shores it becomes a bluish-green, and closer in it is often a greenish-yellow. The colors usually seen in the Black, Yellow, Red, and Vermilion (off California) seas are indicated by their names. In the Gulf of Guinea the sea is white. Around the Maldive islands it is black. These peculiarities of color are partly due to the presence of minute living creatures in the water, and partly to the nature of the sea's bottom.

HEAT AND COLD.

Water is of all substances that which changes its temperature least rapidly. This is a most valuable property in regard to the ocean. During the day it does not become heated so quickly as the land, and during the night it does not part with its heat so readily. Beside the sea it is for the same reason (and apart from other considerations) cooler in summer and not so cold in winter.

DEPTH OF THE OCEAN.

Owing to currents this is difficult to ascertain. The North Atlantic attains its greatest depth between Newfoundland and the Bermudas, the soundings giving 5,200 fathoms, or more than 30,600 feet. If these soundings can be trusted the highest of the Himalayas might be wholly sunk beneath these waters. Very little is known of the depth of the Indian and Pacific oceans.

WAVES, TIDES AND CURRENTS.

Waves are caused by the wind, which, pressing on the surface, causes parts to be depressed below the mean level and and other parts to be raised above it. The height of the waves depends partly on the force of the wind and partly on the nature of the sea. When an ocean shallows along the course of great waves, they do not grow higher, but they change much in character. They first become steeper, and, farther on, the motion of oscillation disappears almost entirely, and the waves are changed into great masses of water traveling bodily onward. As these rollers approach the shore they undergo a further change; for their front becomes steeper and steeper, until their summits actually overhang the advancing base. Then the mass bears over, thundering against the rocks of the shore. At Cape Horn and the Cape of Good Hope, waves in stormy weather reach a height of from 30 to 40 feet.

The phenomenon of the *tides* is caused by the attraction of the sun and moon.

There are various theories as regards *ocean-currents.* Some hold that they are produced by the trade-winds, and that the rest of the current system follows as a consequence; others, that the different weight of cold and hot sea-water causes a disturbance of equilibrium which results in these currents; others that cold water flowing deep down under the surface from the Arctic and Antarctic oceans sets the whole system of circulation in motion; whilst some suppose that the *chief* cause of the oceanic

circulation is the evaporation of water in the equatorial and tropical regions.

MOUNTAINS AND HIGHLANDS.

If the earth had no inequalities the water on it would cover its entire extent. How it came to be sunk at one part and raised at another we cannot tell, but doubtless the action of heat in its center has been a potent cause. It is known that at the present time the crust of the earth is being slowly pressed upward at some places, and depressed at others. These processes sometimes take place quietly, but at others they develop into earthquakes and the eruptions of volcanoes. Parts of the earth's surface which are now under water were once dry land, and we have ample evidence that regions now above the sea-level, forming continents and islands, were once covered by the ocean. Geologists have found that in some regions such changes have taken place several successive times.

All the chief mountains are found either directly connected with other mountains into a more or less regular row of heights, or, if alone, they are so related to island groups, as to show that these are simply the highest peaks of submerged mountain systems. The most remarkable chain of mountains in the world is that which begins at Behring Straits and extends in an almost unbroken chain to Asia Minor. Tracing this chain westward to Turkestan it passes to a remarkably high table-land, 15,000 feet above the level of the sea. We can recognize the extension of the Asiatic chains in those which appear in Europe—it is prolonged through Turkey, Italy, Switzerland, Bavaria and Spain. The Spanish peninsula is almost wholly table-land, the northern part being almost 3,000 feet and the southern about 2.000 feet above the sea-level. The whole interior of Africa, between the Mountains of the Moon and the mountain ranges running nearly north and south, on the eastern and western sides of the continent, is high table-land. Abyssinia is raised about 6,000 feet above the sea-level.

In the new world the mountain system is simpler than in

the old. There is a long range of mountains extending from the extreme north of North America to the extreme south of South America. These are, in the north, the Oregon or Rocky mountains, and in the south the Andes, which possess the highest mountains on this continent. In Mexico there is an extensive table-land of great elevation; the plain of Toluca, on which the city of Mexico stands, is fully 9,000 feet above the level of the sea. In South America are plateaus of even greater height; Chimborazo, and the other giants of the Andes, stand around, as sentinels, the table-land of Potosi, which is 12,700 feet above the level of the sea.

RIVERS AND LAKES.

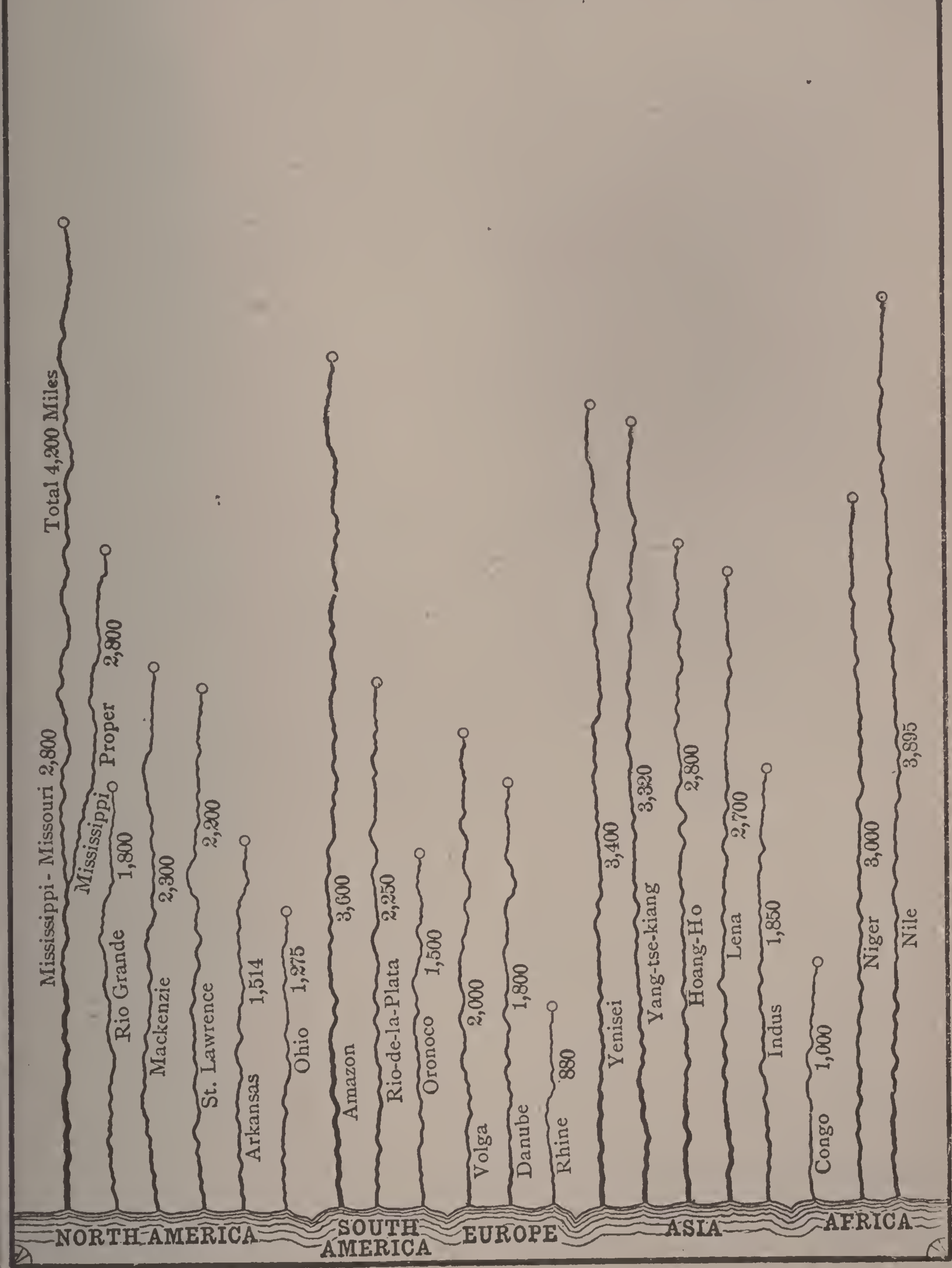
The same forces which have determined and are still influencing the levels of the earth's surface have brought about the existence of rivers and streams. In Europe many of the largest rivers flow into the Mediterranean Sea or the Black Sea, whilst the largest of all — the Volga — flows into the Caspian. Several large rivers discharge themselves into the North Sea and the Baltic. Those that seek the Atlantic are comparatively few. The Nile is the only important African river which flows into the Mediterranean. The whole of the northwestern region of Africa is rainless and riverless, occupied by the vast desert of Sahara. Several considerable rivers, however, flow into the Atlantic, and only one of any importance into the Indian Ocean.

The Asiatic river system shows the influence of the mountain-chains and the high table-lands. All the largest rivers flow from the great central table-land. The Oxus and Sihon flow into the Sea of Aral; three Siberian rivers fall into the Arctic Ocean; three great rivers into seas bordering the Pacific on the west; the Ganges flows into the Bay of Bengal, and the Indus into the Arabian Sea. The Euphrates and Tigris flow into the Persian Gulf from the Armenian table-land.

Australia is practically a riverless continent, and its future

Comparative Lengths of the

PRINCIPAL RIVERS OF THE WORLD.



development will depend greatly on the carrying out of the schemes of artificial irrigation which are now seriously exercising the various colonies.

The river-system of America is relatively far grander than that of the Old World. The American continents taken together do not equal Asia in extent, yet each is irrigated by a river surpassing, as well in length as in volume, the largest rivers of other lands. In North America the Mississippi pursues a course of 3,000 miles in length, receiving on its way the waters of many tributary streams, each exceeding in importance the largest European rivers; of these the Missouri is, properly speaking, to be regarded as the main stream, since its course is far larger than that of the Mississippi above the junction. In South America the Amazon or Muranin traverses a course scarcely less in length, and pours even a greater volume into the Atlantic. "Before arriving at the ocean," says Alison, the historian, "its broad sheet, from the middle of which the eye cannot reach the banks, seems rather to be a fresh-water sea, flowing sluggishly toward the ocean basin, than a river of the continent. From its source to the sea is 2,700 miles. Its breadth, after it emerges from the plain, is generally from two to three miles, and its depth is seldom less than 160 yards. A vehement struggle ensues at its mouth between the river flowing down and the tide running up; twice a day they dispute the preëminence, and animals as well as men withdraw from the terrible conflict. In the shock of the enormous masses of water, a ridge of surf and foam is raised to the height of 180 feet; the islands in the neighborhood are shaken by the strife; the fishers, the boatmen, the alligators, withdraw trembling from the shock; the shores are covered to a great distance with volumes of foam; huge rocks, whirled about like barks, are borne aloft on the surface; and the awful roar, reëchoed from island to island, gives the first warning to the far distant mariner that he is approaching the shores of America." The Orinoco, the Parana, and the San Francisco, are the chief other rivers of South America, but

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some of the streams that flow into the Amazon are larger than the largest rivers of Europe.

In North America, besides the Mississippi, the Rio Grande flows into the Gulf of Mexico. The rivers flowing into the Pacific are not important; but the rivers which flow into the Arctic Ocean, Hudson's Bay and the North Atlantic are not only large, but are remarkable for the great lakes which exist along their course. Lake Superior is more than half as large again as the Sea of Aral.

CLIMATOLOGY.

The *climatology of the globe* relates to the degree of heat and cold to which its respective countries are subject, the dryness and moisture of the air, and its salubrity and insalubrity as influenced by these and other causes. The determining particulars as to the climate of various places in this country has made considerable progress within the last few years, and quite recently climatic maps have been published by Dr. Denison, of Denver, Colo., regarding the whole of the United States, affording very valuable information. Apart from details, however, the following general causes have been sufficiently ascertained as affecting climate: 1. The action of the sun upon the soil and atmosphere. 2. The internal heat of the globe. 3. The height of the place above the sea. 4. The general exposure of the region. 5. The direction of its mountains relatively to the cardinal points. 6. The neighborhood of the sea, and its relative position. 7. The geological character of the soil. 8. The degree of cultivation which it has received, and the density of the population collected upon it; and 9. The prevalent winds. These causes acting together or separately, determine the character of a climate as moist and warm, moist and cold, dry and cold, dry and warm, etc., and this climatic character is the main influence which determines the nature and amount of vegetable and animal development.

The torrid zone has two seasons — the wet and the dry. The latter is considered as the summer, and the former as the winter

of the regions within this zone; but they are in direct opposition to the astronomical seasons as the rains follow the sun. In some districts there are two rainy and two dry seasons in every year. In the temperate zone the year is divided into four seasons whose changes are so agreeable and salubrious. This regular succession of the annual changes can hardly, however, be considered as extending farther than from 35° to 60° of latitude. In the frigid zone two seasons only are known — a long and severe winter, and a short but fervid summer. This abrupt and harsh transition is occasioned by the great length of the day in summer, when the sun never sets, and by the total absence of that luminary during winter. The decrease of heat as we recede from the equator is greater in the southern than in the northern hemisphere. According to Humboldt, continents and large islands as a rule are warmer on their western than on their eastern sides. The extremes of temperature are more felt in large inland tracts than on islands, and situations near the coast. The sea absorbs and radiates heat more slowly than the land ; and thus after the land has lost its warmth, the ocean is radiating its tempering influence. For these reasons, climatologists have found it necessary to construct *isothermal lines* round the globe, that is, lines along which the annual mean temperature is the same. Again, places which have the same mean annual temperature vary considerably in their mean summer and winter temperature ; hence *isochimenal* lines, or lines of equal winter temperature, and *isotheral* lines, or those which show equal summer overpoints, upon different isothermal curves. Another set of lines or curves called *isogeothermal*, connect points where the temperature of the soil is equal at or beneath the surface.

Since the temperature of the atmosphere diminishes with the altitude, a limit must be reached where water will remain in perpetual congelation, independent of all seasonal influences. This limit is called the *snow-line*, and is found at various heights, according to latitude, proximity to the sea, and other causes, which affect the general climate of the region. In the Hima-

laya and Andes it is found at an elevation of 17,000 feet; in the Swiss Alps at 8,500 feet; and in the Scandinavian range at 3,500 feet. Generally in those countries which are near the equator, the snow-line is found about 16,000 feet, or three miles above the sea-level; about the 45th parallel in either hemisphere it occurs at an elevation of 9,000 feet; under 60° of latitude at 5,000 feet or about that; under 70° of latitude at 1,000 feet; and under 80° the snow-line comes down to the mean sea-level, for countries which are 10° distant from the poles are covered with snow all the year round. From snow and glazier clad mountains cold breezes rush down to cool the adjacent plains; and similar winds blow from the arctic to the tropical regions. Indeed, wherever the air of one region becomes heated or rarefied, the colder and heavier air of the surrounding regions will rush in to restore the balance. Such is the cause of all aërial currents, and, in particular, of those blowing within the 25th degree of latitude on either side of the equator, known as the *trade-winds*, *cyclones*, *monsoons*, the *simoon*, *harmattan*, *sirocco*, and other local winds, *sea and land breezes*, and in fact every species of aërial current may be traced to similar causes.

The amount of *rain* which falls on the earth's surface is exceedingly varied, ranging from 20 or 30 inches to several feet per annum, and that within comparatively short distances. The greatest amount of rain recorded is among the Khasia mountains to the northeast of Calcutta; at the Churra station 500 inches have been measured in seven months, and the single month of August has given 22 feet. But the moisture of a climate does not wholly depend upon the amount of the rain-fall registered by a rain-gauge; for some climates are humid and yet not rainy; others dry, yet subject to periodical torrents. These torrents give rise to inundations; hence the peculiar seasonal floodings of such rivers as the Nile and the Ganges. The mean annual fall of rain over the entire surface of the earth is estimated at five feet.

DISTRIBUTION OF PLANTS AND ANIMALS.

The *life* of the globe — that is, its vegetable and animal productions — constitutes its most important and exalted feature as a creation. All the varied materials of which it is composed, all the complicated actions, reactions, and mutations to which they are subject, are humble phenomena compared with the production of the lowliest organism. This life is everywhere; the waters teem with it, the dry land from pole to pole is clad with it; nay, there is life within life, and perhaps there exists not a plant or animal but becomes in turn an abode for others more diminutive.

Vegetables are regulated in their terrestrial distribution by conditions of soil, heat, moisture, light, height of situation, and various other causes; *in the waters* by depth, heat, light, nature of bottom, and the presence of mineral and saline ingredients. Were it not for these causes, there is no reason why the tribes and genera of one region should not be identical with those of another, — why the orange trees of Florida should not bear fruit in Alaska, or the palm trees of India flourish alongside of the oaks of England. As it is, the tropics have genera unknown to the temperate zone, and every advance pole-ward brings us in contact with new and peculiar species. Temperature in this case seems to be the grand regulating condition; and as this is affected by elevation, as well as by increase of latitude, we find the mountain ranges near the equator presenting all the features of a tropical, temperate, and even arctic vegetation. Thus palms and plantains may luxuriate at their bases; then appear oranges and limes; next succeed fields of maize and wheat; and, still higher, commences the series of plants peculiar to temperate regions. In temperate latitudes, though the variety of vegetation is less, similar phenomena present themselves. Besides these great climatic effects, there are others depending on soil, moisture, light, etc., which though limited are not less imperative. Thus the southern slope of a hill is generally clothed with species distinct from those on the north; a lime-

stone district presents a carpet of vegetation widely different from that of a clayey moorland; some tribes flourish in the moist valley, which would die on the open plain; some tribes thrive in the marsh, others on the dry upland; some luxuriate under the influence of the sea-spray, which would be instant destruction to others. But, whilst most species are subject to these laws, there exists in the constitution of many a certain degree of elasticity, which admits of their adaptation to a wider range—a beneficent arrangement, which permits man to extend through cultivation those grains and fruits upon which his subsistence so essentially depends.

The *animals* which people the globe are subjected to somewhat similar laws of distribution. Some are strictly tropical, others confined to the temperate zone; while not a few are destined to exist wholly within the polar circles. Besides this general distribution, we find a more particular restriction to certain continents and tracts where peculiarities of soil, climate and food seem to be the governing conditions. Thus the elephant roams only in India, Burmah and Africa; the ostrich in Africa; the rhea in the pampas of South America; the kangaroo in Australia; the reindeer within the arctic circle; the polar bear amid the snows of Greenland and Labrador. Similar laws are impressed on the life of the ocean. The "right" whale, as it is termed, of the northern hemisphere, is a different animal from that of the southern; for "the tropical regions of the ocean are to him as a sea of fire, through which he cannot pass, and into which he never enters;" while the sperm whale delights in warm water. The herring finds its chosen habitat in the Northern Sea; the oyster clings to a peculiar bottom, at a certain depth; the cod inhabits the same banks and shoals for ages; and a few fathoms of more or less depth would be more fatal to many species of shell-fish than the dredge of the fisherman. As on plants so on animals, altitude exerts a very decided influence; and there is no exaggeration in saying that a lofty mountain range presents a more impassable barrier to

vital distribution than the widest expanse of ocean. Though presenting a close analogy in the manner of their distribution, plants and animals differ in this respect, that many tribes of the latter — birds, fishes, and mammalia — make periodical migrations of vast extent; food and proper breeding-places being the objects of their search. These migrations must not be confounded with that adaptability of constitution displayed by the horse, the dog, the ox, the sheep, the pig. The one is but a change of place in search of food, under a congenial temperature; the other amounts to a constitutional change irrespective of climatic influence.

Man, of all animals, has the widest geographical distribution. This he enjoys not only from the greater adaptability of his constitution, but from that superior intelligence which enables him to counteract the effects of climate by clothing, houses, fire, and the storing of provisions. Though generally regarded as a single species of a single genus, naturalists have divided mankind into several varieties, according to their more prominent physical features; and ethnologists extending the subject according to minor features, language and so forth, have subdivided these varieties into branches, types, tribes and families. That the external conditions, to which man, like all other animals, is subjected, may in course of ages have stamped the inhabitants of certain regions with certain physical characteristics, is nothing more than what might be expected, and division and subdivision may therefore be carried too far, resulting only in confusion and absurdity.

THE EVERLASTING HILLS.

Nature is jealous of any one of her forces acting for an hour alone. The balance must be kept true by the antagonism of her forces,—the one which tears down a made land in order to make a new one, being, as soon as its work is complete, met by another, which begins the labor anew. The volcano, the slow, "secular rise," and the coral polyp, have elevated an island, or a section of country, above the surface of the waves. But it has no

sooner appeared in the supra-aqueous world than the sea begins to attack it, and toss its materials hither and thither, forming out of a solid peninsula strings of islands, or an archipelago of mud flats, such as are witnessed in the Friesian Islands and Holland. We also see this in the way mountains are formed. It is quite incorrect to apply the term "old" to "the hills." In a geological sense, many of them are infinitely newer than the plains, and the physical geographer is well aware that they are anything but "everlasting." They are, in fact, the offspring of rivers which cut up plains into elevated plateaux, of rains which crumble the plateaux into peaks, and of volcanoes and volcanic action which toss up into gigantic mounds the materials which the rivers have for ages been bringing down to the sea, and which the earthquake and the slow, "secular rise" have elevated from the bottom of the ocean or the lake. In a comparatively rainless region, such as that through which the Colorado flows, this eroding action of a river has all its own way. Without its work being neutralized by the play of the rain on the surface washing down the banks, the current wears down its bed, eating deeper and deeper into the soil, earth and rocks alike, until, as in the now well-known cañons of the Colorado and its tributaries, the river flows at the bottom of a cleft more than a mile below the level of the surrounding country.

CHAPTER X.

VOLCANOES.

IN different parts of the earth there are above 200 volcanoes which have been in active operation in modern times. The most famous are Vesuvius, in Italy; Etna, in Sicily; and Hecla in Iceland. By an eruption of Mount Vesuvius, the cities of Pompeii and Herculaneum were overwhelmed 24th August A. D. 79, and more than 200,000 persons perished, including Pliny the naturalist. In June, 1794, a terrific outburst took place; the lava flowed over 5,000 acres of rich vineyards and cultivated lands; the top of the mountain fell in, and the crater is now nearly two miles in circumference.

After the eruption of Coseguina, in Central America, in 1835, ashes were found thickly scattered at a distance of 700 miles, and an area of 25 miles radius was covered to a depth of ten feet. Saugay, a volcano in Central America, in 1842-3, ejected ashes which covered the surrounding country to a distance of twelve miles, in beds from 300 to 400 feet thick. One of the Quito volcanoes in 1797 filled valleys many miles in length, a thousand feet wide, to a depth of 600 feet, with mud composed of ashes and snow. An eruption took place in the island of Tumbawa in 1815, which continued four months without interruption, throwing scoriæ and ashes in such abundance that they broke down the roofs of houses 40 miles distant, and were carried more than 300 miles, in sufficient quantity to darken the air at a distance; while the floating cinders on the ocean formed a mass two feet thick, through which ships could hardly force their way.

Of the effect of submarine volcanoes some interesting observations have been made in modern times. In June, 1811, an island was thrown up by volcanic agency near St. Michael in the Azores. Columns of cinders rose 700 or 800 feet above the surface of the sea, with a noise resembling that of distant artillery. In the course of a few days the island was a mile in circumference, and about 300 feet high, having a crater in the center full of hot water. Some time afterward it disappeared. Many islands that have long been inhabited by man bear all the appearance of having risen in like manner from the bosom of the deep. The islands of St. Helena and Ascension, the Azores, the West India Islands, Iceland, and many of the islands of the Pacific, are evidently the result of volcanic action. "Owyhee," says De La Beche, "is a magnificent example of such an island; the whole mass, estimated as exposing a surface of 4,000 square miles, is composed of lava, or other volcanic matter, which rises in the peaks of Mouna Roa and Mouna Kaa to the height of between 15,000 and 16,000 feet above the level of the sea.

Volcano is derived from *Vulcan*, the god of fire, who was supposed by the ancients to reside in a cavern under Mount Etna, and to forge thunderbolts for Jupiter.

THE GREAT SALT LAKE.

The most striking feature of the valley is the Great Salt Lake — the Dead Sea of America. Curiously enough, the specific gravity of the waters of this lake is almost precisely the same, the solid matter held in suspension in the American lake being no less than 22.422 in 100 parts of water. In other words, if four barrels of its water are allowed to evaporate, nearly one barrel of salt is left. The lake has no outlet — at least none has been discovered—yet the volumes of fresh water poured into it by "the Jordan" and other streams fail to diminish its saltness. Hence it is supposed that it covers a secret bed of saline deposit.

CAVES.

The *Mammoth Cave* in Kentucky, which is the largest in

DESTRUCTION OF POMPEII—See Page 105.

the world, was discovered in 1809; Weyer's cave, in Virginia, 1804; Wyandotte cave, Indiana, 1816. Caves are frequently mentioned in the Bible as dwellings, refuges, and burial-places.

CANALS AND NAVIGABLE RIVERS.

	Miles.			Per 100 Square Miles
	Canals	Rivers.	Total.	
United Kingdom	3,124	1,786	4,910	4
France	3,150	5,240	8,390	4
Germany	1,320	15,760	17,080	8
Russia	873	20,942	21,815	1
Austria	413	2,925	3,338	1
Italy	320	1,590	1,910	2
Spain	270	815	1,085	½
Portugal	...	470	470	1½
Belgium	535	710	1,245	11
Holland	930	340	1,270	6
Denmark	200	...	200	1½
Sweden and Norway	100	460	560	¼
Europe	11,235	51,038	62,273	2
United States	3,330	16,850	20,180	1
Canada	535	2,820	3,355	¼
Brazil	.....	22,210	22,210	1
India	2,240	2,600	4,840	¼
China	5,270	3,800	9,070	½
Total	26,610	99,318	121,928	......

The length of the Suez canal is 92 miles; depth, 26 feet, and it was thirteen years in construction. Tolls average $4,300 per vessel. Steamers pass through in forty hours. For sailing vessels, tugs are provided at a charge of $1,000 extra. The entire cost of constructing the canal was $85,180,000.

The British government owns one-fifth of the shares of the canal, having bought 176,602 from the Khedive in 1876, for £3,976,600, being 12½ per cent premium. The coupons having been cut off, the Khedive pays the interest till 1892. The canal shortens the voyage between England and the East by one-third; that is, it enables two vessels to do the same work that would require three by the Cape of Good Hope.

DESCRIPTIVE NAMES OF CITIES.

Baltimore: "Monumental City;" so called on account of the large number of monuments it contains.

Boston, Mass.: "Hub of the Universe," a name given by O. Wendell Holmes. "Puritan City," "Athens of America," "Modern Athens." The last name is more properly by prescriptive right the designation of Edinburgh, Scotland.

Brooklyn, N. Y.: "City of Churches." From its large number of ecclesiastical edifices.

Buffalo, N. Y.: "Queen City of the Lakes."

Chicago: "Garden City." Chicago is preëminent for the number and beauty of its private gardens.

Cincinnati: "Queen City." A name given when it was *par excellence* the city of the West.

Cleveland, Ohio: "Forest City." From its many avenues of ornamental trees.

Detroit: "City of the Straits." Detroit is situated on the west bank of the river or strait connecting Lake St. Clair with Lake Erie.

Indianapolis: "Railroad City." The terminus of various railroads.

Kansas City: Sometimes called "Garden of the West." The name is shared, however, with other places in the West.

Keokuk, Iowa: "Gate City." Situated at the foot of the lower rapids of the Mississippi.

Louisville, Ky.: "Falls City." Situated beside the falls which impede the navigation of the Ohio river.

Lowell, Mass.: "City of Spindles." The largest cotton manufacturing town in the United States.

Milwaukee: "Cream City." From the color of its brick.

Nashville, Tenn.: "City of Rocks."

New Haven, Conn.: "City of Elms." The streets of New Haven are, many of them, thickly shaded by these splendid trees.

New Orleans: "Crescent City." The older portion of the city is built around a head, forming a crescent, of the Mississippi river.

New York: "Gotham." Originated by Washington Irving. "Empire City." From being the metropolis of the Empire State, and the leading city in the western continent.

Philadelphia: "City of Brotherly Love." From the signification of the name, "Quaker City." Its founder, William Penn, was a Quaker, as were many of his associates.

Pittsburg, Pa.: "Iron City." "Smoky City." On account of its immense iron works and manufactories. The latter name suggests "Auld Reekie," which is a fond, but not now very ropriate name, of Edinburgh, Scotland.

Portland, Me.: "Forest City." From its many elms and other shady trees. The name is shared with Cleveland, Ohio.

Rochester, N. Y.: "Flour City." Famous for its flour-mills.

Springfield, Ill. "Flower City." The capital of the state. Remarkable for its beautiful surroundings.

St. Louis: "Mound City." On account of the large number of artificial mounds which occupied the site of the city.

Washington: "City of Magnificent Distances." The capital of the United States is magnificently laid out. It is intended to cover a space of four and a half miles in length by two and a half miles in breadth, or eleven square miles. These distances are traversed by two sets of streets, at right angles to one another, in width from 70 to 100 feet. These are again intersected in an oblique direction by fifteen avenues, ranging in width from 130 to 160 feet.

CHAPTER XI.

MINING AND MINERALS.

COAL.

THERE are five kinds of fossil fuel: anthracite, coal, lignite, bituminous shale, and bitumen. No satisfactory definition of coal has yet been given. The composition of *wood* is 49.1 carbon, 6.3 hydrogen, 44.6 oxygen; of *coal* 82.6 carbon, 5.6 hydrogen, 11.8 oxygen.

As to the origin of coal, no matter what the variety, there can be no doubt that it is essentially vegetable. Not only are fossil trunks, branches, leaves and fruits found in the mass, but when submitted to the microscope, it often shows the ducts and fibers of a true vegetable structure. We know, moreover, that vegetable matter, when subjected to moisture and pressure, and excluded from the action of the air, will in a short period pass into a bituminous or carbonaceous mass, which time, and greater pressure of heat, would by and by convert into true mineral coal. How the masses of vegetable matter were accumulated is still a subject of speculation with geologists,—some contending that the trees, grasses, ferns, etc., which compose it must have grown and accumulated just as peat mosses do at the present day, and that the land was then submerged, and the mass covered over by layers of sand and mud, which, hardening, formed strata of coal and shale; others reject this theory as untenable, and consider the whole strata,—sandstone, shale, etc., of the coal measures to have been de-

posited in estuaries liable to periodic inundations, like those of the Niger and Ganges, but only on a more gigantic scale. According to this notion, which is more in accordance with the phenomena presented, coal is partly composed of vegetables which grew *in situ,* in the form of jungle, and partly of masses drifted down from the interior by the waters of the river.

There are coal-fields all over the world, although many of them remain as yet untouched. Coal exists in the various parts of Europe, in India, China, Africa, Australasia, and even in some of the islands of the Pacific and Arctic oceans. The coal-fields of Great Britain have been the most famous up to the present time. They are estimated at 5,400 square miles, and the average production or output for five years, ending 1880, was about 134,000,000 tons. This country, however, possesses coal-fields of far greater extent still. For every square mile of coal-field England contains, North America has at least twelve; and for the most part the coal is thicker, more easily worked, and a larger portion of the whole can be obtained. The coal-fields of Pennsylvania, Virginia and Ohio extend continuously from northeast to southwest for a distance of 720 miles; the greatest breadth being 120 miles; its area thus amounting to 129,600 square miles. That situated in Illinois, Indiana and Kentucky embraces an area of 14,000 square miles, while several, many times larger than the largest coal-field in Great Britain, are found in Michigan and other parts of the Union.

It is uncertain when coal first began to be used as fuel, but in all probability it was not earlier than the beginning of the twelfth century. It is within the current century, however, that it has come to be of such enormous importance; since the application of the steam engine to the purposes of the mine, the factory, the railway, the ocean and river boats; since the introduction of gas, the extension of foundries, and the general advancement of those economical processes which distinguish the present from any other period of the world's history.

Anthracite coal, which is produced chiefly in Pennsylvania,

was first used as fuel by two Connecticut blacksmiths named Gore, in 1768-9 ; first used as domestic fuel by Judge Jesse Fell, of Wilkesbarre, Pa., in 1808. Except the diamond, anthracite coal is the purest form of carbon known:

JET,

of which neck-laces, ear-rings and many other ornaments are made, is but a variety of coal, as common in its nature and origin as that we burn in our stoves. It is principally found in Germany, where it occurs associated with AMBER, which is regarded as a fossil gum ; while jet seems to be the trunk and branches of trees more completely bituminized, and freer from earthy impurities than cannel or other coals. It is easily turned on the lathe, or cut with the chisel, and is susceptible of a fine polish. Amber is solid, brittle, commonly transparent, and, when rubbed, becomes electrical. It is found in various countries, more particularly on the Adriatic and Sicilian shores. The largest known specimen was found near the surface of the ground in Lethuania, about 12 miles from the Baltic. It weighs 18 pounds, and is in the royal cabinet at Berlin. Other curious specimens have been discovered, enclosing insects and even drops of liquid.

NAPHTHA—PETROLEUM—ASPHALT.

These may, in a great measure, be regarded as members of the same class, as they are composed of the same elementary substances, carbon and hydrogen.

CALCAREOUS SUBSTANCES.

Under this head are included such economic minerals as contain a notable proportion of *calx*, or lime, in their composition. Common limestone, magnesian, and lithographic limestones, marble, chalk, marl, gypsum, and alabaster, are familiar examples. Some of these have evidently been deposited from calcareous waters ; others are as evidently the production of animalcules. Whatever may have been their several origins,

they have all undergone certain structural changes since their formation,—thus rendering them less or more compact and crystalline, producing a dull massive rock, or a brilliant marble, an opaque gypsum, or a translucent alabaster.

LIMESTONES

fit for building and agricultural purposes, are found in every formation, from the oldest to those of most recent origin. Taken from the quarry, or mine, limestone is broken into fragments of moderate size and conveyed to a kiln, where it is roasted, thereby expelling its water and carbonic acid. In this state it is known as *shell, unslaked or caustic lime,* and requires to be moistened with water in order to convert it into powdery quicklime or *slaked lime.* Limestone is one of the most abundant of rocks, there being no district of any extent in which it does not appear as a member of one or other of the geological formations.

MARBLE

is but a technical term for any species of limestone sufficiently pure and compact to be susceptible of a fine polished surface. No matter what the color, whether white or black, whether studded with the strange forms of fossils, or streaked with the most fantastic veinings, marble is but a carbonate of lime, containing only a few subordinate impurities, which do no more than affect its color markings.

The celebrated marbles of Greece and Rome, such as the Parian, the Pentelic, the Carrara, etc., were of one uniform color, and only occasionally marked with grayish or greenish veins. Besides these, which were chiefly employed in sculpture, and in the decoration of their public edifices, the ancients indulged in a number of fancy marbles, for minor ornamental purposes,—such as black, red, green, yellow, spotted, and veined. Inexhaustible supplies of first-rate statuary and architectural marbles may still be obtained from the Archipelago, from Carrara, Genoa, Corsica, Sicily, and other parts of Italy.

Many marbles are found in France, England, and Scotland. The Kilkenny marble of Ireland is black, and incloses shells of a whitish color, which, when cut across and polished, present various circular markings, which add to the beauty of the slab. The United States possess some excellent architectural marbles, principally of primary formation. One range, which passes unbroken through several of the states, is one of the most extensive and valuable primary limestones in the world. It is of a pure white color, and of a highly crystalline texture, affording blocks of more than 50 feet long and 8 feet thick. It is employed in several of the states' buildings, as, for example the City Hall, New York; and Girard College, Philadelphia.

MAGNESIAN LIMESTONE

is so called from its containing a notable percentage of magnesia, a well-known medicinal earth, commonly obtained by burning the carbonate of magnesia. The compact granular variety of the stone is generally termed *dolomite,* after Dolomieu, a French geologist. The British Houses of Parliament are built of this stone. Natural carbonate of magnesia exists as a component part of many mineral substances, making them feel soft and soapy to the touch. *Sulphate of magnesia* (Epsom salts) is obtained by a simple process from bittern, by treating magnesian limestone with dilute sulphuric acid, or from certain mineral springs. This salt is one of the most common and useful in medicine, and is, moreover, the chief source of the other forms in which magnesia is administered.

MEERSCHAUM,

which means *foam of the sea,* is an earthy carbonate of magnesia, extremely light, and of a yellowish-brown color. It is found in various parts of Southern Europe, particularly Greece and Turkey, where, besides being fashioned into pipe-bowls, it serves also the purpose of a fulling-earth. Germany, however, is the great seat of the meerschaum-pipe manufacture. The substance is first soaked in tallow, then in wax, fashioned into the desired form, and finally polished with shave-grass.

CHALK,

another well-known mineral, is a carbonate of lime of a white or whitish-gray color. It is the last or youngest of the secondary rocks.

GYPSUM,

also known as sulphate of lime, and plaster of Paris, occurs in various states of crystallization and purity; thus the ordinary gypsum of commerce is soft and imperfectly crystalline; *selenite* is a transparent, highly crystalline mass; *satin gypsum* is fibrous, and crystalline; and *alabaster* is pure white and translucent. Gypsum is extensively quarried at Montmartre, near Paris. whence it has derived its ordinary name of plaster of Paris. All sculptures of alabaster should invariably be kept under a glass shade, as a few months' exposure destroys at once their purity of color and marble translucency.

CORAL,

or coral-stone, is another calcareous material. Being entirely the secretion of certain marine animalcules, it is pretty nearly a pure carbonate of lime, and occurs in the warmer latitudes of the Pacific in vast barriers and reefs, often from 50 to 100 feet in thickness, and from a few miles to hundreds of leagues in linear extent. Selecting for their residence some submarine ledge of rock, the animalcules begin to work, increase and spread; when they reach the surface they stop, and proceed sideways, until they complete a mass that may well compete with any of the ancient rock-formations. Coral rock is occasionally employed in the settlements of the South Sea islands as a building-stone, volcanic forces having thrown beds of it several hundred feet above the sea-level. Coral is also used for ornamental purposes, black and red varieties being highly prized. Sicilian coral has been known to bring as much as from \$40 to \$50 an ounce. Regular coral-fisheries are established in the Straits of Messina; on the shores of Majorca and Ivica; the coast of Provence; and in other parts of the Mediterranean.

The Red Sea, the Persian Gulf the coast of Sumatra, etc., produce large quantities.

ARGILLACEOUS SUBSTANCES.

Under this name are included all those substances in which clay (*argilla*) is a prevailing ingredient. Every one is familiar with the common superficial clay, which takes various colors, yellow, red, bluish. Worked up it is manufactured into bricks and tiles, and the coarser sorts of earthenware. For bricks, slabs, crucibles, etc., which have to resist the action of fire, some of the coal-measure clays are generally had recourse to; these, from their purity, and a certain percentage of silica, being susceptible of a more thorough burning.

Pipe-clay, potter's-clay and porcelain-clay are but technical names for pure varieties of well-prepared specimens of the same substance. One of the finest varieties of aluminous earth is the china-clay, or the *kaolin* of the Chinese. This is a decomposed feldspar — one of the constituent minerals of granite — which has been accumulated in vast quantities in certain localities, having no doubt been washed down by rains from the weathered and exposed surface of granitic rocks.

FULLER'S-EARTH

is a soft, dull, unctuous kind of clay, usually of a greenish-brown color. It is used in the fulling of cloth from its property — common to all soft aluminous minerals — of absorbing oil or grease. Soap has now very much taken its place. Every clay that is of an unctuous or saponaceous quality will answer in some degree the purposes of fulling, but not so well as proper fuller's-earth, which is distinguished from common clay by its falling to pieces in water, with a slight crackling noise, instead of making a paste with it as clay does.

OCHRE

is a painter's term for a native earthy mixture of alumina, silica, and oxide of iron.

CLAY-SLATE,

of which roofing and writing slate are the most familiar examples, belongs to one of the lowest or oldest formations, and is essentially composed of alumina and silex. The finer grained varieties are polished for school-slates, and slate-pencils, and those of attractive colors are manufactured into flower-pots, vases, fancy tables, and other ornamental objects. Clay-slate is invariably quarried.

SILICIOUS SUBSTANCES.

Silex, or silica, is one of the most important and most generally diffused of the mineral ingredients that enter into the rocky crust of the globe. Rock-crystal, quartz, chalcedony, and flint may be regarded as nearly pure silica; and all the varieties of sandstone, quartz-rock and granite are in great measure composed of it, — many sandstones, for example, being pure granular quartz, or silica, with a slight cement of clay.

QUARTZ AND QUARTZ-ROCK,

though of importance as forming the basis of other rocks, are of themselves of no great commercial value. Pounded quartz enters largely into the composition of Chinese porcelain; the purer varieties of rock-crystal are occasionally cut as ornamental stones; and the transparent varieties have been adopted by opticians as spectacle lenses. The so-called "Brazilian pebble," used for this purpose, is of pure silica, and is sometimes found in crystals, as large as a cocoa-nut. Quartz, in its crystalline forms, constitutes several of the "precious stones," or gems, and will be further treated under that head.

FLINT.

The common nodular flints found in the chalk-formation are nearly pure silica, exhibiting but a trace of alumina, oxide of iron, and lime. The formation of flint within a mass so different in composition as chalk is still, in some respects, an unsolved problem in geology. It occurs in lumps or knots, nodular

masses, of very irregular forms, some not exceeding an inch, others more than a yard, in circumference. Although thickly distributed in horizontal layers, they are never in contact with each other, each knot or nodule being completely enveloped in the chalk. When taken from the quarry they are brittle, and full of moisture, but soon dry, and assume their well-known hard and refractory qualities. Flints, almost without exception, inclose remains of sponges, alcyonia, echinida, and other marine organisms, the structures of which are often preserved in the most delicate and beautiful manner.

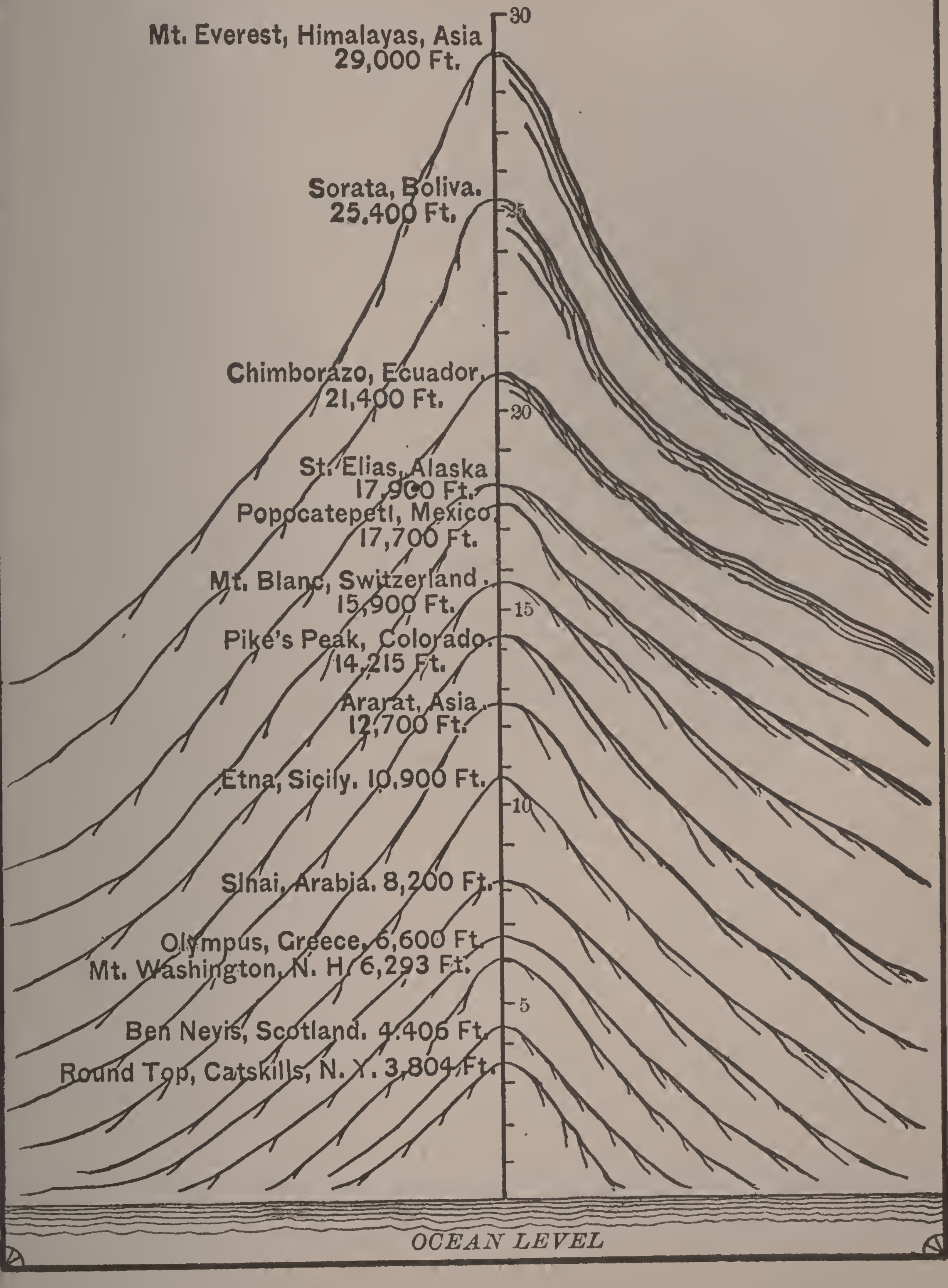
Flint has many uses: calcined and ground to a powder it is employed in the manufacture of the finer sorts of pottery, and porcelain; it also enters into the composition of flint-glass; is used in the preparation of certain kinds of soap; and before the invention of the percussion-cap, gun-flints were in universal use.

SANDSTONE,

or freestone, as it is sometimes called, occurs in innumerable varieties, differing in color, in composition, fineness of grain, and compactness. Thus we have some red from the presence of peroxide of iron; some silvery and glistening, from the presence of minute scales of mica; others white, yellow, and mottled; and some almost jet black from the presence of bituminous or carbonaceous matter. As to mineral composition, there is no other class of rocks so varied; for, though quartz grains give them their family character, clay lime, mica carbon, iron and the like, mingle with them so capriciously, that it is impossible to find any two strata of sandstone exactly of the same composition. Again, their texture is equally if not more varied; in some the grains being as large as peas, in others quite unpalpable; some being so soft and friable as to be rubbed down with the hand, and others so hard and compact that nothing but the chisel of the stone-cutter can touch them.

Besides building and paving, several sorts of sandstone are employed for grindstones, millstones, whetstones and the like.

HIGHEST PEAKS IN THE WORLD'S MOUNTAIN RANGES.



The basin of Lake Superior, the largest collection of fresh water known, is one great synclinal trough formed by a depression in the sandstone which appears to form its bed. It has been satisfactorily determined to be of Lower Silurian age, and probably the equivalent of Potsdam sandstone, the lowest fossiliferous rock recognized in this country.

SAND.

On narrowly inspecting the immense masses of sand scattered over the face of the country, it will be found that the great bulk of it is composed of silicious particles, evidently derived from decomposed quartz-rock, granite, sandstone, and the like. As might be expected, most sands are mingled with clay, lime, and other earthy impurities; and it is according to their silicious character, and degree of freedom from earthy ingredients, that they become of value in arts. Thus sharp, well-sifted sand is an indispensable ingredient in well prepared mortar, without which the builder, the plasterer and fresco-painter could not proceed a single step. Good silicious sand is necessary for the making of all sorts of glass, now one of the most important manufactures in the civilized world.

GRANITE ROCKS.

This term may be considered as embracing not only the true igneous granite, but the gneissose and mica slate rocks, which, though stratified, partake of the same mineral character, and are usually associated with it. In all of them, silica is a predominant ingredient, but other minerals, such as hornblende, hypersthene, etc., occasionally mingle with it, thus producing a number of varieties. Granite compounds form the fundamental rocks of many mountain chains. The Andes, South America; the Abyssinian and other African ranges; the Ural in Russia; the Pyrenees in Spain; the Dofrefeld in Norway; the Wicklow mountains in Ireland, and the Grampians in Scotland, are all more or less composed of rocks partaking of a granite character.

The economical uses to which granite rocks are applied are by

no means unimportant. Compact granite, from its extreme hardness, is largely employed in the construction of docks, piers, light-house foundations, bridges, and other structures where durability is the principal consideration. The Pyramids, though internally constructed of limestone, are externally coated with granite. Pompey's Pillar, and other ancient Egyptian structures, are composed of it; so, too, is the pedestal of the colossal statue of Peter the Great in the Russian capital. Many monumental monoliths in this country are of granite.

MICA, TALC, ASBESTOS,

and other minerals, are the products of the granite and primary rocks. The silvery-looking scaly substance, which occurs in ordinary granite, is *mica*, so called from its glistening appearance. It is sometimes found in crystals more than a foot square; and when of this size is split into thin plates, and, from its transparency, used in certain cases as a substitute for glass. It stands a higher degree of heat without splintering, than glass, and is well adapted for ship lights, not being liable to fracture during the firing of canon. *Talc slate* is employed in the porcelain and crayon manufactures, and is used as a marking material by carpenters, tailors and others. *Asbestos* (unconsumable) or *amianthus* (undefiled), is a soft mineral, occurring in separate filaments of a silky luster, and consisting essentially of silica, magnesia, and lime. When steeped in oil it may be woven into cloth, which is incombustible, and may therefore be purified by fire. Cloth of this kind was used by the ancients to wrap the bodies of the dead about to be burned, to prevent their ashes being mixed with those of the funeral pile. In this country asbestos is sometimes used as a lampwick.

BASALTIC ROCK.

This includes all the basalts, greenstones, whin-stones, and traps which make up the sum of the igneous rocks of the secondary formations. They are essentially silicious,—quartz, hornblende, hypersthene, augite, and so forth, entering largely into

their composition. Some of the basalts and greenstones dress well under the hammer, and though of a dingy character, make an excellent building-stone, durable as granite itself.

VOLCANIC PRODUCTS.

These are chiefly lava, obsidian, pumice, scoriæ, and a light impalpable dust, in all of which silica and alumina are the main ingredients. *Obsidian,* so named, according to Pliny, from Obsidius, who first brought it from Ethiopia, is a true volcanic glass, of various colors, but usually black, and nearly opaque.

In Mexico and Peru it is occasionally fashioned into adzes, hatchets, and other cutting instruments, or into ring stones. It closely resembles the slag of our glass-furnaces, and consists chemically of silica and alumina, with a little potash and oxide of iron. *Pumice,* a well-known volcanic product, is extremely light and porous and of a fibrous texture; it is harsh to the touch, is usually of a grayish color, and has a shining pearly luster. Like obsidian it is principally composed of silica and alumina, with traces of potash, soda and oxide of iron. It is used for polishing metals, glass, marble, wood, ivory, and also in the smoothing of parchment and vellum.

SALINE SUBSTANCES.

These comprehend such products as rock-salt, alum, saltpeter, borax and the like, which are found either as native salts, or are procured by artificial processes from certain mineral substances with which they are combined in nature. Some of these salts are of vast economical importance, and appear to be as indispensable to the progress of civilized life as either coal or iron. The common culinary salt of every-day life is a chloride of sodium, every 100 parts of which are composed of 60 chlorine, and 40 soda. It constitutes about the thirtieth part of the weight of sea-water; it is discharged by salt or brine springs (which arise from different geological formations, and are situated in different countries) to the extent of from 20 to 30 per cent; and it is found in various degrees of purity, in beds

and irregular masses from 20 or 30 to more than 120 feet in thickness. Native chloride of sodium is never found in a state of absolute purity, but is always less or more combined with certain salts of lime, magnesia, etc.; to free it from these impurities and render it fit for culinary purposes, is the occupation of the salt boiler and refiner.

ALUM

is a well-known earthy salt found native only in small quantities, but largely manufactured. It is used in dyeing, and calico-printing; in lake colors, in leather-dressing, in the preparation of paper-pastes, in clarifying liquors, and by candle-makers to harden and whiten tallow.

SALTPETER,

or nitrate of potash, is used in the manufacture of gunpowder, signal-lights, nitric and sulphuric acids, and in dyeing, curing of meat, and in medicine.

BORAX

is a compound salt, and is largely employed by brasiers, silversmiths, and other workers in metals as a flux; by potters in the formation of a glaze for earthenware and porcelain; in the fabrication of artificial gems; in medicines; and in other minor arts.

CHAPTER XII.

METALS AND METALLURGY.

THE peculiar luster of metals, arising out of their opacity and reflective power with regard to light, their conduction of heat, and electricity, their density, fusibility, ductility, malleability, and the like, are features, which, though differing in each, yet readily distinguish them as a class from all other substances. It is this density, and hardness in some, this ductility and malleability in others, and the facility with which many of them can be amalgamated, that have rendered them such valuable aids to human progress, and made them available for almost every purpose of utility and ornament. Without them, indeed, any high degree of civilization would be impossible; they are essential to every process in agriculture, architecture, machinery, navigation, — to every art, in a word, which marks the advancement of mankind from the lowest stages of barbarism. As elementary substances, their scientific distinctions belong to the science of *chemistry;* the present chapter takes to do with their history, the localities where found, the modes of obtaining and preparing them, the purposes to which they are applied, their relative values, and other particulars of economic importance.

GEOLOGICAL CONDITIONS.

The metals, as found in nature, are seldom in a state of purity. It is true that the miner occasionally detects a fragment of native metal — pure and ductile as from the crucible of the chemist — but such fragments are rare, and bear no

appreciable proportion to the quantity which occurs in the crude state of *ores.* These ores are sulphurets, carbonates, oxides, etc., mingled with earthy impurities, generally situated in veins, sometimes disseminated through rocky masses, rarely in beds or strata, and distributed through the formation, but more especially through those of the primary and transition series. Thus iron, the most familiar and useful of all metals, occurs in more than twenty different mineral states, being combined with carbon, oxygen, sulphur, phosphorus, etc.; is found in veins traversing different formations; is disseminated through various rocks, so as to give to them a ferruginous aspect; and, as clay ironstone, is interstratified with the clays and shales of the coal-measures. To arrange and classify the ores is the study of the mineralogist; to determine their value, or the amount of metal they contain, is the art of the chemist; to raise them from their various positions is the labor of the miner; to separate the metal from the earthy impurities is the work of the metallurgist; and to fashion it into implements, utensils, and machines, is the calling of the founder, machinist, blacksmith, cutler, and the others. As with the ores of iron, so with those of the other metals, only that few of them can be said to occur stratified like the clay or carbonaceous ironstone. It must not be supposed, however, that the respective metals always lie in separate veins — that copper, for example, is always the only metal found in a copper vein; or lead in a so-called vein of lead. The fact is that, although some one metal generally predominates, three, four, or even more metals may be strangely combined and intermixed in the same veinstone.

BEDS. — VEINS.

The natural position in which the metalliferous ores generally occur, is *veins, beds* or *strata,* and *fragmentary deposits.* In the last of these the ore is associated with sand, gravel, and other superficial débris, which have evidently been transported by alluvial agency from mountain metalliferous districts. The *strata* are for the most part composed of earthy matter, less or

more impregnated with one or other of the metals, but it is only those in which the metallic ingredient is peculiarly abundant that demand the attention of the miner. *Veins*, however, are the principal forms in which metallic ores are distributed throughout the crust of the globe.

A vein may be said to resemble a deep cleft or rent, in a clayey field, which has been subjected for some time to the dessicating influence of the sun's rays. This cleft, whatever may be its depth, must of course have a direction under the ground, either slanting or perpendicular; and if we suppose it filled with metallic ore, we form the idea of a vein, or, as it is termed, a *lode;* if we suppose the cleft filled with a stony substance, we can imagine what is called a non-metalliferous vein or *dike*, of which there are many, sometimes pursuing their own exclusive courses, and at other times intersecting the metalliferous veins. The direction of the lodes is by no means accidental, but nearly determinate. They usually *strike* east and west, and *dip* or underlie either towards the north or south; while the non-metalliferous veins, which run north and south, dip either towards the east or west. It frequently happens that the metalliferous ores, as was said, intersect each other; and, as a leading fact, the intersection of two lodes at a small angle, is productive of good ore.

The compositions of the lodes or veins are as variable as the nature of the rocks, through which they pass. By far the greater number consist of matter similar to that of the contiguous or intersected rock; but many also contain large intermixtures of quartz. These ingredients for the most part are mingled without regularity or order, and throughout them are dispersed the metallic ores. Sometimes these are aggregated very thickly, and very generally occur in large irregular lumps or patches, called *bunches*, connected with each other by small films or *threads* of ore. On referring to the *known* depths to which metals extend, it will be found that those which commonly lie near the surface, as lead, zinc, gold, and occasionally

tin, do not generally penetrate to any great depth; while those that lie deeper, as copper and silver, are worked in the bottoms of our deepest mines. This arrangement may be the result of a natural law, or it may be apparent only, and consequent on the limit of our knowledge and experience.

MINING OPERATIONS.

A mine in a complete working condition exhibits a most extensive series of operations, in connection with the shaft, the lifting and descending by ropes and pulleys, the drainage, the excavation, the ventilation, etc. At the bottom of the shaft, and in the various stages in which the excavations are going on by the miners in their attempt to follow the lodes, the operations are on a scale which seldom fail to surprise strangers. When the levels have been carried to a considerable distance from the shaft, the ventilation will be found defective. This deficiency is still further augmented by the increasing number of men now employed in the works, the presence of a great number of candles and lamps, and the smoke resulting from the large employment of gunpowder, in the process of blasting. The irregular distribution of the metalliferous portions of the lode becomes the cause of inequality in the workings, and renders the sinking of one or more shafts indispensable.

When circumstances permit, mines are entered by an adit on the hillside, instead of by shafts. Where the edges of the strata are exposed to view, a spot is selected from which it may be practicable to drive a level upon the vein itself, and in one of the beds known to be favorable to its productiveness. The mining of stratified ores, as the clay or carbonaceous ironstone, is conducted precisely in the same manner as coal.

GOLD.

As the most valuable and longest known of the metals, gold deserves to be noticed first. When pure, it is of a deep and peculiar yellow color, rather soft, and extremely heavy, having a specific gravity of 19.5 — that is, nineteen times heavier, bulk

for bulk, than pure water. It exceeds all other metals in ductility and malleability; it may be beaten into leaves of 1,282,-000th of an inch in thickness, and a single grain may be drawn out into 500 feet of wire. Though soft, its fusing point is as high as 2016° of Fahrenheit; it is unchanged by fire with access of air—the hottest furnace producing no other effect on it than to keep it in fusion. It expands during fusion, and contracts on cooling, more than any other metal. It is not acted upon by any of the common acids; but chlorine and a mixture of hydrochloric and nitric acids (*aqua regia*), corrode and dissolve it, forming a chloride of gold which is soluble in water. The metal occurs in greater or less abundance in almost every quarter of the globe; and is obtained either in native state from alluvial sands and gravels, or in mineral veins in combination with silver, and often mixed with metallic sulphurets and arseniurets. In the native state it occurs in small crystals, in threads or granular fragments, which, when of a certain magnitude, are called *nuggets*.

The geological formations in which gold occurs are the crystalline primitive rocks, the compact transition strata, the trachytic, and trap rocks, and alluvial grounds of the current era. In the three former sources the ores of the metal are *in situ*, that is, in their original situation; in the latter it is a traveled, or transported, product, being carried thither from the rocks in which it was originally formed, by streams and rivers. In the former case it is obtained by the difficult and dangerous process of mining; in the latter the soil or gravel is merely turned over and the metallic portions — the *gold dust* of commerce, — separated by handpickings, washings, and siftings. California and Australia are the great sources of gold in the present day. The most extensive gold-mining operations in the world are at Sandhurst and Ballarat in the latter country. The golden wealth of California surpasses anything yet known to have been discovered, and its influence in the march of the world is to be ranked among the great events of modern times. The existence of gold

in California had been long known, but it was not until the region passed into the possession oi the United States that this knowledge was made practically available. The first effectual discovery of gold was in the spring of 1848. In November of that year it was estimated that from four to five million dollars had been taken out. During the years 1848 and 1849 it is supposed that about $40,000,000 were obtained from the washings, there being before the close of the last named year between 40,000 and 50,000 Americans and 5,000 foreigners engaged in digging. The yield for 1850 has been estimated at $50,000,000.

In the treatment of gold ore various metallurgic processes are adopted in various countries, but on the whole that of stamping and amalgamating seems to be the readiest and most successful. The metallurgic grains found in the sands of rivers do not require to be subjected to any metallurgic process in the strict acceptation of the term.

SILVER.

This is another of the metals which have been longest known and esteemed, having been extensively employed from the earliest times in the fabrication of articles both of utility and ornament. The word *silvery*, taken from its own appearance, best describes its beautiful color and luster. In malleability and ductility it ranks next to gold, being frequently hammered into leaves one 10,000th part of an inch in thickness. Its specific gravity is only 10.5 and its fusing point 1873° of Fahrenheit. Silver is a widely disseminated product of nature, occurring in the metallic or *native* state in fine threads or strings in various rocks, but chiefly in veins in primitive and secondary mountains. It is found also in combination with other metallic ores, as those of lead, and as a native sulphuret.

Silver, as has been said, is widely distributed, but the great sources of supply are in Mexico and Peru. The silver furnished by the United States comes almost wholly from the native gold of California, for it may be explained there is no native gold, however pure, without some admixture of silver.

The numerous uses and applications of silver are well known. In its pure state it is too soft for coin, plate, and most ornamental purposes; but, alloyed with copper in proper proportions, it becomes hard without being materially impaired in color. In the arts, silver is extensively used, particularly for silvering or plating other metals; and, for this purpose, silver-leaf and solutions of silver are applied much in the same way as in gilding. The oxide of silver is used for coloring porcelain; and several of its salts are now largely employed as the principal agent in preparing photographic portraits. When a solution of nitrate of silver is mixed with alcohol a violent effervescence ensues, and *fulminating powder* is produced, one of the most dangerous compounds known, exploding with violence upon the slightest friction, or when struck, rubbed, or heated.

COPPER.

This was one of the earliest known of the metals, and not less extensively used than known, by the ancients, its tenacity and durability rendering it the best substitute for iron, ere man had learned to reduce that valuable but more refractory metal. It derives its name from the island of Cyprus, where it was extensively mined and smelted by the Greeks, who employed it either pure or in an alloyed state (bronze) in the fabrication of their domestic utensils and implements of war. It is a metal of a beautiful red color and considerable luster, very malleable and ductile, but more capable of being hammered into leaves than drawn into wire. In tenacity it yields to iron, but surpasses gold, silver and platinum — a wire of only one-tenth of an inch being strong enough to support a weight of 300 pounds. Its specific gravity is 8.96, and its fusing point 1996° Fahrenheit, that is, nearly a white heat. It is found occasionally in a native state in films, strings, or amorphous masses, but in no considerable quantity. The most remarkable masses hitherto discovered are said to be one in Brazil, which weighed 2,620 pounds; another in the bed of a stream to the south of Lake Superior, which measured not less than 15 feet in circumference, and a third in Australia. The

great source of the commercial supply is, as in the case of other metals, from ores, of which the most productive is copper pyrites,—that is, copper in certain combinations with sulphur and other metallic impurities. A less abundant ore of copper is the carbonate of copper, which often occurs associated with the copper pyrites. Copper mines are largely worked in England, Chili, Cuba, Germany, Sweden, Siberia; less extensively in France, Spain, Hungary, and Norway; and with great success in this country on the shores of Lake Superior, and in Australia.

The uses of copper are numerous and highly important, the metal ranking next to iron in real commercial value. It is used, as is well known, for coin, for sheeting or sheathing the bottoms of vessels; for boilers, and a great variety of implements and utensils; in the manufacture of blue and green colors; and in medicine. Alloyed with zinc it forms brass and pinchbeck; gun-metal, a strong and valuable alloy consists of 90 parts of copper and 10 of tin; *bell* and *speculum* metal contain a much larger proportion of tin, and are consequently brittle and less durable. A good *bronze* for statues is made of 91 parts copper, 2 tin, 6 zinc, and 1 lead. The bronze of the ancients was an alloy of copper and tin. *Ormolu* is the name given to a particular alloy of 52 parts zinc and 48 copper. All these alloys are of infinite use, entering into the fabrication of almost every species of machinery, implement, utensil and ornament—from the drawing, pointing and heading of a pin, or the stamping of a button, to the casting of a statue, or the founding of a ponderous field-piece. Though thus vieing with iron in its applicability to the purposes of civilized life, its salts and solutions are highly poisonous; hence the frequent evils arising from the use of neglected or ill-cleaned culinary utensils of copper.

What is called *bronzing* is a method of coloring wood, iron, plaster of Paris, or other material, so as to imitate bronze, which has, in reality, little connection with that alloy.

IRON.

This truly precious metal is capable of being cast into

molds of any form; of being drawn out into wires of any desired length and fineness; of being extended into plates or sheets; of being bent in every direction; of being sharp-pened, hardened, softened at pleasure. Iron accommodates itself to all our wants, our desires, and even caprices; it is equally serviceable in the arts, the sciences, agricult-ure and war. The same ore furnishes the sword, the plow-share, the scythe, the pruning hook, the needle, the graver, the spring of a watch or carriage, the chisel, the chain, the anchor, the compass, the cannon and the bomb. It is a medicine of much value, and the only metal friendly to the human frame. The ores of iron are scattered over the face of the globe with a beneficent profusion, proportioned to the utility of the metal; they are found under every latitude and zone, and in every geo-logical formation.

The preparation of pure iron takes place only in the chemical laboratory. It has a bluish-gray color and strong metallic luster, which is heightened by polishing. It has a specific gravity of 7.84, and is one of the most infusible of metals, requiring the highest heat of a smith's forge to liquefy it. When beaten out under the hammer it exhibits a granular structure; but when passed repeatedly between rollers, it assumes a fibrous texture in the direction of the length. This fibrous character is best seen in ordinary malleable or bar iron which is almost pure; and the great difference in the com-parative strength of *bar* over *cast* iron depends on this property. The axles of railway cars are most carefully prepared from iron which has been rolled and rerolled till the fibrous appearance is at a maximum; but, unfortunately, such precautions are unavailing, as true fibrous iron, after much wear and tear, espe-cially when repeatedly strained or jolted, gradually loses its thread-like structure and becomes crystalline and brittle. This alteration in the arrangement of the physical atoms of the iron of axles, doubtless occasions many serious accidents on our railroads.

When raised to a red heat, iron admits of being hammered into any form; and subjected to a white heat two pieces of this metal may be readily and completely joined together. This operation is called *welding,* and no metal can surpass iron in its readiness to be manipulated in this manner. It is powerfully attracted by the magnet, and at the same time becomes magnetic; but it loses this property the moment the magnet is withdrawn. *Steel,* however, may be rendered permanently magnetic by being rubbed over with a magnet. When exposed to air and moisture iron absorbs oxygen, and passes into *peroxide* or *red oxide of iron,* in other words, *rust.*

Metallic iron is seldom found native. Meteoric iron, an alloy usually of iron and nickel, is more abundant; there is a mass of this kind in Yale College cabinet, which weighs 1,635 pounds; it was found on the Red river, in Texas. In Connecticut a vein of native iron was found two inches thick, capable of being wrought into nails by the blacksmith. In Germany and France smaller pieces have been found; and very thin plates or scales are disseminated through rocks of the basalt, gneiss, and mica-schist character.

Though rarely found as a metal, iron is abundantly and widely distributed in other conditions. All spring and river waters contain more or less iron in solution, and in some the quantity is so great that an ochery deposit takes place on the stones over which the water flows, or in the lakes into which the ochery spring enters. This phenomenon may be witnessed in Garfield Park, Chicago. All soils contain iron, to which they owe their red or rusty aspect, and the majority of stones are composed in part of this metal.

The United States abound in iron, and especially in *magnetic iron ore* or *loadstone.* In the state of New York the deposits of iron ore are on the most extensive scale, and of the most varied character; Pennsylvania has immense resources in this respect. It has been estimated that about 15,000 square miles are occupied by the coal measures; and, when the abundance

of the iron ores, which these and the strata below them contain, is taken into consideration, some idea may be formed of the capacity of production of the state. Virginia abounds in iron ore as well as coal. Tennessee is one of the most important iron-producing states of the Union. The iron ores on and near Lake Superior form literally mountain masses, sufficient to furnish an unlimited quantity of the purest and finest ore. Nearly the whole of Illinois and a considerable part of Indiana is underlaid by a coal measure, and valuable beds of argillaceous iron are said to exist in them. The resources of Missouri for the manufacture of iron are very great.

LEAD.

This is another of the metals which have been long and extensively used in the arts of civilized life. It has a grayish-blue color, with a bright metallic luster when newly cut, but soon tarnishes, and assumes a dull earthy aspect on exposure to the air. Its texture is close, like that of gold and silver; its specific gravity is about 11.45; and it is very malleable and ductile, but soft and unelastic. It is one of the least sonorous of the metals; melts at the low degree of 600° Fahrenheit; soils the fingers when rubbed; and emits a peculiar odor. Though readily oxidized by exposure to the air, the oxidization does not proceed far; hence the durability for roofing and other external purposes. Pure, or distilled water, put into a clean leaden vessel, and exposed to the air, soon oxidizes and corrodes it; and delicate tests discover oxide of lead *in solution* in the water. River and spring waters do not act so readily on metallic lead, but few, if any, of the waters introduced into towns or houses for culinary purposes are *entirely* without a solvent action on lead. This action may be only $\frac{1}{100}$th to $\frac{1}{10}$th of a grain of lead in one gallon (70,000 grains) of water, when it may be reckoned harmless; or it may amount to a larger fraction, when it becomes dangerous to be taken into the animal system. Leaden cisterns may be used with impunity for the preservation of most ordinary spring or river waters, and the more so that the crust

which forms upon the metal effectually retards all further action. As this crust partly consists of carbonate of lead, which is very poisonous, great care should be taken to prevent its diffusion through the water upon any occasion, as by scraping or cleaning the cistern. Natural waters, highly charged with carbonic acid, cannot, however, under any circumstances, be kept in lead vessels, or passed through leaden pipes with safety.

Fourteen or fifteen ores of lead are known to mineralogists; but that of *galena*, a sulphuret of the metal, is the only one occurring in sufficient quantities to become an object of mining and metallurgy. It is found but sparingly in the primitive crystalline rocks, more plentifully in the transition schists and slates, and most abundantly in the transition and mountain limestones.

The principal lead mining countries are Britain, Spain, Prussia, Bohemia, France. The mines of lead are abundantly scattered over this country, which has produced a larger amount in value of this metal than of any other with the exception of iron and gold. The productive mines are chiefly concentrated within a district of comparatively small extent known as the Upper Mississippi lead region; but there are numerous lead-bearing veins in the Atlantic States, in various geological positions.

Metallic lead is used for numerous purposes in the arts; rolled into *sheets*, it is used for roofing, lining cisterns, tea-boxes, etc.; cast into *pipes* it is employed for conducting of water, gas, and the like; and alloyed with arsenic, and dropped through perforated trays from lofty towers (as at Baltimore), it forms shot of various sizes; alloyed with tin, in different proportions, it constitutes *solder* and *pewter;* and with antimony and tin it forms *type* and *stereotype metal.* *White lead,* a carbonate of the metal, is a well-known paint; as is also the beautiful yellow chromate; while the acetate of lead, commonly known as *sugar-of-lead,* is employed for various purposes in the arts, and in medicine.

ZINC.

Though known as early as the beginning of the sixteenth century, the numerous and important applications of zinc, or *spelter*, as it used to be called, are for the most part of recent date. Its distinguishing characteristics are bluish-white color and luster; specific gravity 6.89; at common temperatures tough and intractable; but heated to between 220° and 320° Fahrenheit, it becomes malleable and ductile, so that it may be hammered out, rolled in sheets, perforated, and even drawn into wire of such tenacity that one-tenth of an inch in diameter is capable of sustaining a weight of 26 pounds. Heated beyond that point — say between 400° and 500° Fahrenheit — it again becomes so brittle that it may be reduced to powder in a mortar. It melts at 773°; and heated beyond this it takes fire in the open air, and burns with a brilliant bluish flame. The metal is obtained from two ores, namely, *calamine*, a native carbonate; and *blende*, or *black jack*, a native sulphuret. These ores occur in two geological positions, namely, either in the carboniferous or in the magnesian limestone, associated with galena, and sometimes with the ores of cadmium.

Zinc ores are found in Britain, but the quality is inferior to that of Germany. In this country the zinc ores of New Jersey are important, and the mines of that state till recently were the only ones on the American continent. Pennsylvania is also rich in this metal, and ores of lead are plentifully distributed through the lead mines of the Mississippi valley.

Zinc being a cheap and light metal, and one which, when superficially oxidized, long resists the further action of air and water, is now employed as a substitute for lead in lining cisterns and baths, covering roofs, forming water-spouts, and the like. It is also used in the manufacture of kitchen and dairy utensils; it is wrought into buttons and other notions; and zinc plates are used in the transfer of printing under the title of *zincography*. Its sulphate and oxide are employed in medicine; and with copper it forms, as already described, the well-known alloy, brass.

Though the action of water upon zinc is scarcely perceptible, after it once has been coated with the oxide, yet the addition of a little acid — as sulphuric — dissolves and removes this coating, and further oxidation proceeds with rapidity. It is this action which renders zinc so powerful a generator of electricity in the voltaic tile or battery.

ALUMINUM.

Aluminum is a white metal somewhat resembling tin in external appearance, but with a much less specific gravity. It does not tarnish when exposed to the air; even when raised to a high temperature it does not oxidize; so that it may be regarded as unalterable. It possesses remarkable sonorous properties, and in this respect is not outrivaled by the most sonorous alloys, such as bell-metal. No other single or pure metal possesses the sonorous character, in an unmixed or unalloyed condition. Aluminum appears likely soon to rank as one of the most useful and serviceable of the metals.

TIN.

This was known to the ancient nations of the Levant, who obtained it chiefly from Spain and Britain. It is a white, brilliant metal; has a slight taste and smell when rubbed; is malleable to a considerable degree, but is inferior in ductility and tenacity. Its hardness is intermediate between that of gold and lead; its specific gravity is about 7.3; it melts at 442° Fahrenheit, and at a white heat takes fire, and burns with a brilliant flame. It oxidizes but slowly on exposure to air and moisture; hence its value in coating or tinning more oxidizable metals, as iron. Tin is rather a rare metal, and is principally found in primitive rocks, where it occurs chiefly in veins, but partly also disseminated, and in beds. There are only two ores of the metal known,— the double sulphuret, which is rare, and the native peroxide, from which the commercial supplies are obtained.

This latter ore is found abundantly in Cornwall and the western district of Devonshire, England; in Germany, Bohemia,

and Hungary; in Chili and Mexico, and in Malacca and Banca in the East Indies.

A single crystal of oxide of tin, weighing 50 grains, was found by President Hitchcock, state geologist, many years since at Goshen, Mass. It was contained in granite. This was the first discovery of this metal within the territory of the United States. Since then it has been found in various places in small quantity. The only locality in this country where it has been discovered in any appreciable degree is at Jackson, N. H., in 1840. Mining, however, does not seem to have been had recourse to.

Besides other uses alluded to, tin is used in the process of enameling; in silvering, or rather tinning, looking-glasses; in coating pins; by dyers and calico-printers as a *mordant* when dissolved in hydrochloric acid; largely in the form of *foil* or leaf, which is made by beating; its oxide is much used in polishing, under the name of *putty-powder*.

CHAPTER XIII.

METALS AND METALLURGY.

(*Continued.*)

MERCURY or quicksilver is a well-known metal, of a brilliant silver-white color, fluid and mobile at ordinary temperatures; hence the name of *live* or *quick* silver. In this property of fluidity it differs from all other metals — never becoming solid unless when subjected to a degree of cold equal to 39° or 40° Fahrenheit, that is, 39 or 40 degrees below zero. In this condition it has been obtained by Arctic explorers, who, under extreme depressions of temperature, found their barometers and thermometers useless, and who, for curiosity's sake, have shot bullets of it from their muskets. When solid it is found to be malleable, a fact of no practical importance, however. It boils and vaporizes at about 600° Fahrenheit. Its specific gravity is about 13.59; thus ranking above all other metals, with the exception of platinum, gold and tungsten; it is found native in small quantities — that is, in minute dewy globules; but for commercial purposes it is always extracted from the ore called *cinnabar*. This ore is a sulphuret of the metal, of a red color — except in the hepatic variety, which is gray — massive and crystallized, occurring in veins, and distributed variously through the matrix of the veinstone. It is found but sparingly in the primitive rocks; the principal deposits of the mercurial ore being, in all parts of the world, in the middle secondary strata — that is, in the upper portions of the coal-measures, and in the magnesian limestone and new red sandstone.

The most productive mines of cinnabar are those of Almaden, near Cordova, in Spain; of Idria in Austria; of Huancavelica in Peru, at an elevation of 14,500 feet above the level of the sea. Quicksilver is also procured in several of the Chinese provinces.

Mercury is chiefly employed for *amalgamation* with other metals, chiefly gold and silver, so as to extract them from their ores; and it is almost solely for this purpose that it is imported into South America and Mexico. It is used in gilding, in silvering mirrors, in filling thermometer and barometer tubes; in various philosophical apparatus; and in chemistry it furnishes the only means of collecting, in the pneumatic trough, such gases as would be absorbed by water. In medicine it is employed in several forms; the whitish insipid powder called *calomel* is the sub-chloride of mercury; and the acrid, nauseous white substance known as *corrosive sublimate* is the perchloride. This sublimate has been applied as an antiseptic in the prevention of the dry-rot in lumber, of the mildewing of sail-cloth, and the like. Mercury is also used in the making of *vermilion*, that beautiful pigment being prepared from an artificial cinnabar, composed of eight parts of mercury and one of sulphur. When mercury and sulphur are triturated together in a mortar, the latter gradually disappears, and the whole assumes the form of a black powder denominated *ethiops mineral*; if this powder be heated red-hot, it sublimes, and, on a proper vessel being placed to receive it, a cake is obtained, of a fine red color, which, when reduced to powder, forms the vermilion of commerce. An amalgam of mercury and silver is used by dentists for stopping decayed teeth.

ANTIMONY.

This metal was discovered by Basil Valentine in 1490, and has since been extensively employed in medicine, in the composition of printing types, stereotype plates, music plates, and the like; and also in the white-metal utensils now so generally used in the place of silver. When pure, it is of a silver-white

color, brittle, has a specific gravity of 6.8, and melts readily at a red heat. The oxides and salts of antimony are used in medicine, their general effects being purgative, sudorific and emetic. The metallic ore of commerce contains sulphur and other impurities, and is much more easily fused than the pure metal, which has a hardness about that of gold. Its tenacity is also considerable — a wire of one-tenth of an inch in diameter being capable of supporting a weight of ten pounds. The powder of the sulphuret is very black, and was employed by women in ancient times to stain their eyebrows and eyelids.

Antimony is never applied to any useful purpose as an independent metal, in consequence of its brittleness and liability to corrosion; but it forms several valuable and extensively employed alloys. Thus, alloyed with lead, in the proportion of 2 to 6, with greater or less proportions of copper or tin, it constitutes the metal used for printing-types; used with lead alone the compound forms the rather brittle plates upon which music is engraved; and an alloy of 112 lead, 18 antimony, and 2 block tin, forms a convenient stereotype metal. These alloys have the property of expanding as they cool; the consequence of which is, that the types come out of the mold with sharp and well-defined edges. Hard pewter is made of 12 parts of tin and 1 of antimony; and Britannia, or white-metal spoons, knives and forks, etc., are composed of 100 tin, 8 antimony, 2 bismuth, and 2 copper. The manufacturer of pastes, or fictitious gems, employs the oxide of antimony to give color to his so-called beryls, oriental topazes, and yellow diamonds.

BISMUTH.

This metal is of a brittle crystalline texture, reddish-white in color, and fusible at the temperature of 497°. Its hardness is between that of copper and lead; it is scarcely malleable, breaks under the hammer, and cannot be drawn into wire. It is by no means a common metal.

It is used as a *flux*—that is, for communicating fusibility to other metals, *solder*, for example, consisting of 1 bismuth, 5 lead,

and 3 tin,—an alloy which melts at a lower temperature than lead. Bismuth forms the basis of sympathetic ink, a kind of ink with which characters may be traced on paper that are invisible when cold, but become visible by exposure to heat, and again fade when cool, by absorbing moisture from the air. The powder called *pearl-white,* used in medicine, is obtained from the nitrate of the metal, which, when dropped into water, falls down as a white powder, insoluble in water. The nitrate has also been employed as a mordant for lilac and violet dyes, in calico printing. Some of its forms seem also to have been employed in the preparation of cosmetics, for a story is told of a lady who, on visiting one of the watering-places of Germany, emerged from her bath as *a lady of color,* the chemical action of the mineral water having turned almost to blackness a cosmetic containing bismuth, which had been previously applied to her face.

COBALT.

Cobalt is a reddish-gray metal, somewhat soft; fusible at a temperature a little below that required for the fusion of iron. The finest ores are found in Saxony (Prussia), where it received its name (*Kobald,* a devil); a term applied to it by the miners, who considered it unfavorable to the presence of the more important metals. It is never employed in the arts in the metallic or separate state; but the impure oxides of the metal, called *zaffer* and *smalts,* are extensively used as coloring material.

The oxide of cobalt is an invaluable article in the manufacture of porcelain and pottery; all the blue colors of which are derived from that substance. When fused with glass it communicates to it a blue tint without affecting its transparency; and, what is especially valuable, this color is not impaired by a very high temperature. So great is the coloring power of cobalt that a single grain gives a full blue to 240 glasses. Cobalt blue or Thernard's blue, is a beautiful pigment, prepared from the phosphate of cobalt, which may be employed by decorative painters and artists as a substitute for ultramarine.

NICKEL.

This metal, discovered by Brandt in 1733, is exceedingly brittle, of a strong metallic luster, and white color, running into steel-gray. Its specific gravity is 5.67; when heated it volatilizes, emitting a strong odor of garlic before it fuses, and is readily inflammable. The pure metal is so brittle that it may be easily reduced to a fine powder by trituration in a mortar. The *arsenic of commerce* is the white oxide of the metal, or, more accurately, *arsenious acid*—a compound which is obtained chiefly from Bohemia and Saxony, in roasting the cobalt ores for making zaffer, and also by sublimation from arsenical iron pyrites. Arsenious acid is originally prepared in cakes, brittle, white, faintly sweetish in taste, and more or less translucent; for medicinal purposes these cakes undergo sublimation, in order to get rid of sulphur and other impurities. In the druggist's store it is usually sold in the form of a white gritty powder.

Arsenious acid, although one of the most virulent poisons, is used in medicine, forming a notable ingredient, for example, in what are called ague-drops. It is also present as an ingredient in a kind of green and other dyes; in the manufacture of flint-glass; and is employed in rare instances by candle-makers, to impart a white and waxy appearance.

PLATINUM OR PLATINA.

Platinum was unknown in Europe till about the middle of the last century, when it began to be imported in small quantities from South America. It is of a whitish silvery color; hence its name from the Spanish *plata*, silver. It is the heaviest, the most difficult of fusion, the most ductile, and the most flexible of the known metals, having a specific gravity of 21.5, and capable of being hammered into leaves, or drawn into wires of extreme tenuity. Its hardness is between copper and iron; and, though very infusible, it is malleable, and capable of being welded at a white heat, either one piece to another, or to a bit of iron or steel. It is not in the least affected by the action of

air or water, and is not capable of attack by any of the pure acids; but it is dissolved by chlorine, and nitro-hydrochloric acid (*aqua regia*). In ductility and indestructibility it is hardly inferior to gold.

When a perfectly clean surface of platinum is presented to a mixture of oxygen and hydrogen gas, it has the extraordinary quality of causing them to combine, so as to form water, and often with such rapidity as to render the metal red hot.

The perfection with which vessels of platinum resist the action of heat and air, of most of the acids, and of sulphuret and mercury, renders them peculiarly valuable to the chemist; so that, notwithstanding the high value of the metal, which is between four and five times its weight in silver, it is now much employed for crucibles, retorts for the distillation of sulphuric acid, mirrors for reflecting telescopes, and by gunsmiths and others.

MANGANESE.

This is a very brittle metal, of a dusky white color, and without either malleability or ductility. The substance known under the name is the peroxide, or black oxide of the metal. It is found in a variety of forms; most commonly it is of an earthy appearance, and mixed with other ingredients, but sometimes in crystals of a black color and metallic luster. The metal separately is of no use, but the binoxyd is a source of oxygen, and is largely employed in the decomposition of common salt for the production of chlorine for bleaching. It is also used by potters and glass-makers as a glaze or pigment, and by calico-printers as the source of certain brown shades. A certain proportion of manganese added to steel produces a valuable cast-steel.

CHROMIUM.

Chromium, from the Greek word *chroma*, color, discovered by Vaugnelin, in 1797, resembles iron in color, and is brittle and difficult of fusion. It is rarely to be found in its metallic state; but several of its compounds, as chromate of iron and chromate of lead, are well known in commerce. The former, a compound of oxide of chrome, with oxide of iron, is found, amongst other

places, near Baltimore, Md. It appears massive, or in crystals of a dark color, and imperfect metallic luster. It is employed in the manufacture of chromate of potash, a yellow salt, largely employed by calico printers. Chromate of lead occurs massive and crystallized, of a deep orange color; but when reduced to powder it becomes orange-yellow. It forms an excellent pigment, and is used both in oil and water colors, in calico printing and dyeing. The other compounds chiefly in use are the *oxide of chromium*, employed to give a green color to glass and porcelain; and *chromic acid*, which from its property of destroying most animal and vegetable coloring matters, is advantageously employed in calico-printing. It is this acid which gives color to the ruby, and the green of the emerald is owing to the oxide of chromium.

RARE METALS.

Cadmium, palladium, osmium, iridium, tungsten, molybdenum, rhodium, vanadium, etc.

PROPORTIONS OF VARIOUS COMPOSITIONS IN COMMON USE.

(In 100 Parts.)

Babbitt's Metal	Tin 89, Copper 3.7, Antimony 7.3.
Fine Yellow Brass	Copper 66, Zinc 34.
Gun Metal, Valves, etc	Copper 90, Tin 10.
White Brass	Copper 10, Zinc 80, Tin 10.
German Silver	Copper 33 3, Zinc 33 4, Nickel 33.3.
Church Bells	Copper 80, Zinc 5.6, Tin 10.1, Lead 4.3.
Gongs	Copper 81.6, Tin 18.4.
Lathe Bushes	Copper 80, Tin 20.
Machinery Bearings	Copper 87.5, Tin 12.5.
Muntz Metal	Copper 60, Zinc 40.
Sheathing Metal	Copper 56, Zinc 44.

THE EFFECTS OF HEAT ON VARIOUS SUBSTANCES.

Antimony melts at	951	deg.
Bismuth "	476	"
Brass "	1900	"
Copper "	2548	"
Glass "	2377	"
Gold "	2590	"
Cast-Iron "	3479	"
Lead "	594	"
Platinum "	3080	"
Silver "	1250	"
Steel "	2500	"
Tin melts at	421	deg.
Zinc "	740	"
Ice "	32	"
Mercury boils at	662	"
Naphtha "	186	"
Fresh Water boils at	212	"
Sea Water "	213.2	"
Ether "	100	"
Oil Turpentine "	304	"
Linseed Oil "	640	"
Sweet Oil "	412	"

EXPANSION OF METALS.

Metals expand by heat, and contract by cold; and in almost all mechanical operations, unless the tendency to expand is allowed to act, very great strains are brought to bear upon the material. The following table shows the amount of expansion for different materials per foot:

	Expansion per deg. Fah.	Expansion from 32° to 212°.
Iron	.0000067	.00122
Steel	.0000069	.00124
Copper	.0000090	.00171
Zinc	.0000160	.00294
Tin	.0000120	.00217

Almost all solid bodies expand equally for each degree between freezing and boiling, or from 32° to 212° of Fahrenheit's thermometer. A bar of iron therefore, which is 12 feet long, by an increase of 60° of temperature becomes 50x12x.0000067= 12.0048 feet in length.

PRECIOUS STONES.

Precious stones are but compounds of carbon, alumina, silica, lime, etc. As none of them, however, occur in rocky masses, but rather as crystals, geodes, and concretions within other rocks, and as fashion has generally set a price upon them wholly disproportionate to their utility, they are best treated as a separate class. *Diamond* is the most highly prized; it is the hardest known substance, and is of unsurpassed luster. Ornamental diamonds bring exorbitant prices. The Koo-i-noor, which is now the property of Queen Victoria, is valued at $500,000. The largest known diamond was brought to the King of Portugal from Brazil. It is uncut; weighs 1,680 grains; and its value is $30,000,000. Similar extravagant valuations are applied to the Russian diamond, weighing 193 karats, which after passing through several hands was purchased by the Empress Catherine for $450,000; an annuity of $20,000, and a title of nobility.

Diamond consists solely of carbon, being in fact a crystallized charcoal.

Sapphire, Ruby, Topaz, Garnet, etc., may be grouped together as consisting essentially of crystallized alumina, the specific distinctions being caused by traces of magnesia, silica, fluoric acid, chromic acid, etc.

Corundum, or *adamantine spar,* is nearly allied to the sapphire, being next in hardness to the diamond. It is almost a pure crystalline alumina, and is used for polishing and cutting much the same as diamonds are.

Emery is a variety of corundum with an admixture of iron, which gives it a bluish-gray color.

The *Garnet* belongs to the same section, and is to be found in various colors.

Emerald, Beryl, Amethyst, Carnelian has silica as the predominant ingredient. Fine emeralds are extremely rare. *Beryl* differs only in color. *Amethyst* is a pure rock crystal of a purplish-violet color, and of great brilliancy. It was the opinion among the Persians that wine drunk out of an amethyst cup would not intoxicate; hence the name from the Greek *amethystos.*

Agate, Chalcedony, Opal, Carnelian, Sardonyx, Jasper, and some kindred substances may be, without much impropriety, regarded as merely varieties of the same mineral, having different colors and degrees of transparency.

DIAMOND FIELDS OF SOUTH AFRICA.

In 1867 a trader named O'Reilly was passing through Barkly, a small village on the banks of the Vaal River, where he slept at the house of a Dutchman named Van Niekirk, and saw the children playing with a bright, sparkling pebble. The stone struck him as being something curious, and he begged it from Van Niekirk, who did not like to take it away from the children, but eventually parted with it for the sum of five pounds. He also told O'Reilly that he had seen several of these kinds of pebbles in the hands of native chiefs, who kept them for charms. O'Reilly some weeks afterward turned up in Grahamstown, and showed the stone to

Mr. Galpin and Dr. Atherstone; they both declared it to be a diamond of the first water, and it was afterward sold to Sir Philip Wodehouse, the governor of the colony, for the sum of $2,500. It weighed about 21 karats. The news spread, but was not believed at first, and it was 1869 before any number of people were at Barkly, Pneil, and Gong-Gong, digging away in the river bed, removing enormous bowlders, and finding diamonds in fairly large quantities amongst the most beautiful pebbles and garnets, agates and carnelians; the presence of garnets being almost a guarantee of the proximity of the diamond. In 1869 was found the first large diamond, called the Star of South Africa. It is pear-shaped, and weighed 83½ karats in the rough. Messrs. Lilienfeld Brothers, of Hope Town, purchased it for $55,000. They were afterward offered $200,000 for it in Port Elizabeth, by a syndicate of merchants, but thinking it was worth quite $500,000 refused to sell it, and eventually sold it to Hunt & Roskell for $100,000, who in their turn sold it to Lord Dudley, and about twelve years ago it could be seen in a tiara of Lady Dudley's which was exhibited at the South Kensington Museum. Then Mr. Spalding found his diamond weighing 287 karats, slightly off-colored. Thousands now flocked to the river diggings, and prosperity began in all directions. It is strange but true that all the great discoveries of minerals and precious stones have been by pure accident.

HOW GOLD IS EXPORTED.

Each keg contains $50,000 in clear gold. It is from the Bank of America, at New York, that most of the gold is shipped from that city. The foreign steamships sailing from this city now carry little or no gold, although the reverse was the case years ago. The shipments of gold are not generally on the bank's account. At a first glance persons might well suppose that when the demand rises for gold to send abroad the shipper would only have to send in his order for his hundreds of thousands to the Sub-Treasury, where millions of specie are on deposit. But there are sufficient reasons why this plan will not work. The Sub-Treasury can pay out its coin only to creditors of the gov-

ernment. With the Bank of America the associated banks keep on deposit constantly an enormous sum of gold, sometimes amounting to $40,000,000. To the members of the bank association the Bank of America issues its own certificates against these deposits redeemable on demand. So, when there is occasion for making a gold shipment, the coin is prepared for that purpose in the rear office of that bank; here it is bagged and kegged and made ready for shipment. Kegs in which gold is packed — specie kegs, as they are called — are made of extra hard wood. They must have an extra iron hoop. Specie is not thrown loosely into a keg, nor, upon the other hand, is it carefully wrapped in tissue paper and piled up one coin upon another. The keg serves only as a protection for canvas bags, into which the gold is placed in the ordinary hit-and-miss fashion of pennies in a man's pocket. Into each bag goes $5,000, and ten bags fill a keg. In the interest of security each keg is treated to what is technically known among the shippers as the red-taping process. At each end of the keg, in the projecting rim of the staves above the head, are bored four holes at equidistant intervals. A piece of red tape is run through these holes, crossing on the head of the keg, and the ends finally meet in the center. At the point of meeting the tape is sealed to the keg's head by wax bearing the stamp of the shipper. Gold crosses the ocean very much as does every other kind of freight, without any special looking after. The average rate of insurance is about $2,000 on a shipment of $1,000,000. There are shippers who do not insure. Having to ship $1,000,000, they give it in equal parts to half a dozen different vessels. It is a strict rule with some firms never to trust more than $250,000 at a time on any one ship. A certain party furnishes all the kegs for gold and packs them. The man who does this is a monopolist in his way. Shippers of large amounts always lose a few dollars by abrasion, but not exceeding sixteen ounces on a million-dollar shipment. The only protection to be found against abrasion lies in the shipment of gold in bars instead of coin. Gold bars are not readily obtained.

CHAPTER XIV.

RAILWAYS IN THE UNITED STATES.

THE following figures exhibit the growth of the railway system from 1827, when the first line was opened at Quincy, Massachusetts, to the end of the year 1887:

EXTENT OF LINES.

1830..........	23 miles.	1870..........	53,399 miles.
1840..........	2,818 "	1880..........	84,393 "
1850..........	9,201 "	1885..........	125,379 "
1860..........	30,635 "	1887..........	151,060 "

In 1884 there were throughout the whole world about 291,000 miles of railway.

The total capital invested in United States railways in 1885 was $7,676,399,054; the gross yearly earnings, $763,306,608; and the net earnings, $266,513,911.

TELEGRAPHS.

These are mostly in the hands of the Western Union Telegraph Company. In 1886 they had 151,832 miles of line; 489,607 miles of wire; and 15,142 offices. The number of messages was 43,289,807.

The aggregate mileage of telegraph lines in the United States, open for public business, exceeds 170,000 miles.

TELEPHONES.

In 1886 there were 114,371 miles of telephone wire belonging to one company; 330,040 telephones, with 752 exchanges. The extent of mileage of telegraph wire put up for telephone use in the United States is estimated at 130,000 miles.

RAILWAY ACCIDENTS IN THE UNITED STATES.

	Killed.	Injured.		Killed.	Injured.
1873	276	1,172	1881	414	1,597
1874	204	778	1882	380	1,588
1875	234	1,107	1883	474	1,954
1876	323	1,097	1884	389	1,760
1877	214	1,047	1885	307	1,530
1878	204	756	1886	391	1,620
1879	185	709	1887	401	1,726
1880	315	1,172			

These figures apply to accidents caused by wrecking of trains only. A larger number of casualties occur from the crossing and walking along railroad tracks, and by persons falling from cars; but these are not reported.

ELECTRIC MACHINES.

The electric properties of rubbed amber are said to have been known to Thales 600 B.C. and Pliny 70 A.D.

Otto Von Guericke constructed the first electric machine (a globe of sulphur) about 1647. Stephen Gray, aided by Wheeler, discovered that the human body conducts electricity, and that electricity acts at a distance, 1720-36; the Leyden jar (vial or bottle) discovered by Kleist, 1745; Franklin demonstrated the identity of the electric spark and lightning, drawing down electricity from a cloud by means of a kite, 1752; at a picnic he "killed a turkey by the electric spark, and roasted it by an electric jack, before a fire kindled by the electric bottle," 1748; discoveries of Galvani and Volta, 1791-3; telegraphs invented by Schilling, Gauss and Weber, 1833; by Steinheil and by Masson, 1837; by Morse (died 1872), 1837; the first telegraph line in America set up from Washington to Baltimore, 1844; submarine telegraph from Dover to Calais laid 1851; the American combination system, conveying 2,000 words an hour, adopted by the American Telegraph Company, 1859; the Atlantic telegraph projected by Peter Cooper, Cyrus W. Field, Moses Taylor, Marshall O. Roberts and others, including Prof. Morse, 1853; two attempts failed, but on the third a junction was effected by 2,050 miles of wire between Valentia in Ireland and Newfoundland.

The first message was from the Queen of England to the President of the United States, and the second was his reply, 1858; a second cable was laid, 1866; European end of the French Atlantic cable laid at Brest, June 17th, and the American end at Duxbury, Mass., July 23d, 1869; the Brazil telegraph cable completely laid, 1873. International Congress of Electricians at Paris, 1881.

Electric Clock.—Prof. Wheatstone invented an electro-magnetic telegraph clock in 1840.

ELECTRIC LIGHT.

Humphrey Davy produced electric light with carbon points, 1802; the French government ordered eight light-houses to be illuminated by Watson's electric light, 1858; the electric light successfully employed for photography, 1876; T. E. Edison announced at New York his discovery of a method of producing a great number of lights and much mechanical power by his "telemachon," which may be worked by water-power or steam; panic among gas companies, 1878.

Electric Loom.—Invented by M. Bonelli of Turin, 1860.

Electric Pen.—Invented by T. E. Edison, 1877.

Electro-tint.—By which engravings may not only be copied from other engraved plates, but the engraving itself actually produced by electrical agency, 1841-2.

ELECTROTYPE.

Mr. Spencer in England and Prof. Jacobi, in Russia, made the first successful experiments in this art in 1837 and 1838. Since then Mr. A. Smee and others have perfected the process. In 1840 Robert Murray applied black-lead to non-metallic bodies as a conducting surface, and in the same year Ruolz and Elkington applied it to gilding and silver-plating. Since 1850, printing-types and wood-cuts, and casts from them, have been electrotyped with copper, and the process is now largely adopted by the arts.

Electric Railway.—By Werner Siemons and Halske opened near Berlin, 1881.

THE TELEPHONE.

An apparatus for conveying articulate and musical sounds by means of wire, vibrating rods, threads, or magnetic-electricity. Robert Hook transmitted sounds to a distance by means of extended wire, 1667; Prof. Pepper lectured on Wheatstone's telephone before the Queen, 1855; experiments at Boston with Prof. A. Graham Bell's articulating telephone; speech, music, singing, laughing, distinctly heard at Salem, eighteen miles distant, 1877; Edison's carbon "loud speaking" telephone, 1878.

Telephotography.—A process for transmitting to a distance images of objects by the agency of electricity and selenium, was invented by Sherwall Bidwell early in 1881.

PHOTOGRAPHY.

The action of light on the chloride of silver was known as early as the sixteenth century. Wedgewood may be regarded as the first *photographer*, 1802. Louis J. M. Daguerre commenced his experiments in 1824; the production of *Daguerreotype* plates was announced in January, 1839; the Photographic Society of London was established in 1853; the small photographic portraits termed *cartes de visite* are said to have been first taken at Nice by M. Terrier in 1857. The Duke of Parma had his portrait placed upon his visiting card, and his example was soon followed. In 1861 Mr. Thomson, Weymouth, England, photographed the bottom of the sea. Photography was successfully applied to the transfer of works of art to wood blocks in 1861. H. Van der Weyde, an American artist, succeeded in making electric light very effectual in photography, 1876-8. Celestial photography began with Prof. Bond of Cambridge, U. S., who exhibited a photograph of the moon in 1851. Dr. Henry Draper of New York, in 1859 made a photograph of the moon fifty inches in diameter, the largest and best ever made. In 1872 Dr. Draper, with a telescope and apparatus constructed by himself for the purpose, photographed the spectra of the stars for the first time in the history of celestial photography. In 1880 and 1881 he photographed the nebulæ in Orion.

THE FIRST PRINTING.

Photoheliograph.—An apparatus for registering the position of the sun's spots by means of clockwork and photography by Sir John Herschel about 1857.

Photogalvanography.—The art of producing engravings by the action of light and electricity; the earliest specimens were produced by Nicephore Niépee in 1827.

Photo-sculpture.—M. Villème's employment of photographs in the formation of sculpture was announced in 1863.

PRINTING.

Block printing was invented by the Chinese about 593 A. D. Movable types made in the tenth century. The honor of first printing with single types in Europe has been appropriated to Mentz, Strasburg, Haarlem, Venice, Rome, Florence, Basle, and Augsburg, but the claims of the first three only are entitled to attention.

Adrian Junius awards the honor of the invention to Laurens Jansen Coster of Haarlem, who printed with blocks a book of images and letters about 1438; John Fust established a printing office at Mentz, 1442; John Gutenberg invented *cut* metal types and used them in printing the earliest edition of the Latin Bible at Mentz, 1450-5; William Caxton set up the first press at Westminster, England, 1470; Aldus cast the Greek alphabet and a Greek book printed 1476; he introduced italics; produced the "Pentateuch" in Hebrew, 1482; printing used in Scotland, 1509; the "Liturgy," the first book printed in Ireland by Humphrey Powell, 1550; first printing in America in New England, when the *Freeman's Oath* and an almanac were printed 1639; "Bay Psalm Book" printed at Cambridge, Mass., 1640; stereotype printing practiced by William Ged of Edinburgh about 1730; the present mode of stereotype invented about 1779; the composing-machine used in America, 1863.

THE TYPE-COMPOSING MACHINE.

The best known and most perfect type-composing and distributing machine is that invented by Timothy Alden of Yar-

mouth, Mass., born 1819, died 1858. It was first patented in 1856. This machine was imperfect, and was afterwards much improved by Henry W. Alden, cousin of the inventor. He was assisted in this work by W. Mackay. The machine thus improved was worked in the *Tribune* office during the years 1855-60. The necessity of a "distributor" that would not require the type to be classified, had long been felt, and John T. Slinger, a practical scientific machinist, discovered a method by which it could be effected. He also remedied several minor defects, and rendered the machine practical and useful.

TYPE-WRITERS.

M. Foucault sent to the Paris exhibition in 1855 a writing-machine for the blind; and several were invented by Wheatstone. After successive improvements, Messrs. Remington of this country in 1873 contracted to construct 25,000. The speed is seventy-five words to a minute.

The action of the type-writer somewhat resembles that of the piano-forte. Pressure upon a key marked with a letter raises a hammer with a type-cut letter which presses upon the paper; provision is made for inking the type, shifting, etc.

There are numerous other inventions which are of a similar description to that given above, but there is not in any of them a distinctive feature so marked as to call for specific mention.

REMARKABLE RAILROAD WRECKS.

September 15, 1830. William Huskinson, M. P. and promoter of the railway, was killed on the day of its opening whilst standing on the track talking to the Duke of Wellington. It was the first railroad in England, between Liverpool and Manchester.

December 24, 1841. Accident on the Great Western Railroad, England. A train, moving in a fog, came in contact with a mass of earth, which had slipped from the embankment in a cutting; eight persons were killed and seventeen injured.

May 8, 1842. Catastrophe at Versailles, France, on the

birthday of Louis Philippe, which was celebrated at Versailles, twelve miles from Paris. On some of the visitors returning to the city in a crowded train, an axle broke, carriages were piled on each other and took fire. Fifty-two or more persons were killed and forty injured. Whole families perished.

May 6, 1853. Accident at Norwalk, where the railroad crosses a small inlet of Long Island Sound by means of a draw-bridge. Whilst the bridge was open, the foremost carriages of a passenger train from Boston were precipitated into the water. More than one hundred persons were plunged into the channel; forty-six lost their lives and thirty were more or less severely injured.

November 1, 1855. On the Pacific Railroad of Missouri, the bridge over the Gasconade gave way under an excursion train. Twenty-two lives sacrificed; fifty injured.

October, 1854. Accident on the Great Western Railroad of Canada. A passenger train, approaching Detroit, came into collision with a gravel train, and was thrown off the track, and down an embankment. Some of the cars were telescoped. Forty-seven persons were killed and sixty injured.

July 17, 1856. Wreck at Campbell station, about twelve miles from Philadelphia. An excursion train, carrying about eleven hundred Sunday-School children, came into collision with a regular train on a single track. Five cars were burned; sixty-six persons perished and more than one hundred were injured.

March 17, 1857. The Des Jardines Canal disaster. The Great Western Railroad here crosses the canal at an elevation of sixty feet. It was winter and the ice was two feet thick. The train went off the track, and on to the timbers of the bridge which finally yielded, the cars being precipitated below. There were marvelous escapes, but out of ninety persons sixty perished, including every woman and child.

June 17, 1858. Catastrophe near Port Jervis on the Erie Railway. The express from New York, between Otisville and

Port Jervis, came upon a broken rail. The two last cars were derailed, and breaking the coupling, went over an embankment thirty feet high. Six persons were killed and thirty injured.

August 25, 1861. Accident on the London and Brighton Railway, England. A collision occurred far within Croydon tunnel, which is $1\frac{1}{4}$ miles long, between an excursion and an accommodation train. Twenty-three corpses were taken out, and one hundred and seventy-six were injured.

June 25, 1864. Lamentable accident to a party of over 500 immigrants, chiefly Poles, Germans and Norwegians of the better class, on the Grand Trunk Railroad of Canada, at the Richelieu river, Belœil. The iron drawbridge was open, and the entire train went down forty-five feet, sinking a barge which was passing through. About one hundred perished and hundreds were injured.

August 16, 1865. Accident on the Housatonic Road of Connecticut. An engine ran into a passenger train destroying the rear car and a portion of the next, when its boiler burst. Eleven persons were killed and seventeen badly injured.

March 7, 1865. On the Camden and Amboy Road, passing through Bristol, about thirty miles from Philadelphia, the express train from Washington to New York dashed into the rear of an "owl train." There were about fifty sufferers, mostly soldiers, on their way home from the army on furlough.

December 18, 1867. Terrible calamity on the Lake Shore Road at Angola, a small way station in the extreme western part of New York. Crossing a bridge across a ravine there, two derailed cars were precipitated over the side. In the foremost but one person was killed, but in the last, which was burned, forty-one persons are supposed to have perished, and only three escaped.

August 20, 1868. Accident at Abergele, Wales, to the "Irish Mail," the most famous train run in England. It ran into an oil train, and, taking fire, the foremost carriages were utterly consumed, and every person in them perished. The engineer

succeeded in uncoupling six carriages and drawing them away from the rest. No one was injured. It was annihilation or complete escape.

February 6, 1871. At Wappinger's Creek, not far from New Hamburg. A terrible affair; derailment; collision on a bridge in the darkness of night with oil cars; blazing fire. The engineer Timmons died at his post like a hero; twenty-one persons lost their lives, and a large number were injured.

August 26, 1871. Catastrophe at Revere, six miles from Boston, on the Eastern Railroad of Massachusetts; frightful rear-end collision. Twenty-nine persons perished and fifty-seven were injured.

December 24, 1872. Near Prospect, N. Y., on the Buffalo, Corry & Pittsburg Road. A trestle bridge gave way, the train going down thirty feet into a ravine; the cars caught fire from the stoves, and nineteen lives were lost, mostly by burning.

December 24, 1874. Accident at Shepton-on-Cherwell, England; caused by derailment; thirty-four passengers perished and sixty-five were injured.

December 29, 1876. Terrible disaster at Ashtabula, Ohio. The bridge, a span of one hundred and fifty feet, over a ravine sixty-nine feet deep, gave way. The train was precipitated to the bottom; fire broke out, and in a few minutes there was a human holocaust. Many escaped as by a miracle, but some eighty persons are supposed to have lost their lives, and more than sixty were injured.

April 14, 1876. Accident at Carr's Rock, sixteen miles west of Port Jervis; caused by derailment. Four carriages went over the embankment, and rolled down into the ravine. Twenty-four persons were killed and eighty injured.

August 9, 1877. Catastrophe on the Long Branch line of the Central Road of New Jersey, at the Shrewsbury river. A derailed train plunged over the side of the bridge; seventy persons were injured, of whom five subsequently died.

January 15, 1878. On the Connecticut Western Road, half

a mile west of Tariffville. A party of excursionists were returning from a Moody and Sankey meeting, on a special train, when a bridge of two spans of one hundred and sixty-three feet each, crossing the Farmington river, gave way. Thirteen persons were crushed to death or drowned, and thirty-three others injured.

May, 31, 1879. Frightful catastrophe on the Tay Bridge, Dundee, Scotland. During a hurricane a passenger train and the bridge itself were blown into the river. Not a soul escaped to tell the tale. About seventy-four lives were lost. The bridge has just been rebuilt.

June 24, 1881. Catastrophe in Mexico, through the fall of a bridge near Cuartla. The train was precipitated into the river Antonio, and about two hundred lives lost.

January 13, 1882. The two rear cars of the Atlantic express from the west on the New York Central and Hudson River Railway were crushed and jammed together, by the Tarrytown local train near Spuyten Duyvil creek. Twelve persons were killed, some of them being burned to a cinder. About forty were injured.

January 12, 1883. On the Wabash Road near Olmstead; train derailed; five persons fatally injured and nine seriously.

January 19, 1883. The Southern express from San Francisco was wrecked near Sehachapi station, Kern county. The train broke away down a grade of one hundred and twenty feet to the mile. The hindmost sleeper jumped the track, and went over the embankment; fire ensued, and a number of persons were roasted to death. Twenty-one perished, eleven corpses being beyond recognition.

February 1, 1884. Accident eight miles north of Indianapolis, Indiana. The span of a bridge over the White river gave way, and three cars were dropped into the river. Six persons lost their lives, of whom five were burned beyond recognition. There were ten injured.

June 14, 1884. On the Camden and Atlantic Railroad near Ashland. An accommodation and an excursion train col-

lided, the latter carrying Sunday-School children. The accident was caused by the non-receipt of a telegraphic message. Eight persons were killed and nearly a score injured.

July 19, 1884. Catastrophe to an excursion train two miles east of Canton, Ohio, on the Connotton Valley Railroad. There were two thousand passengers on board; the train was derailed by a broken frog, and two carriages went over an embankment. No one was killed outright, but nearly one hundred were injured.

October 4, 1884. A local working train was wrecked near Ashland, Wisconsin, on the Omaha Road. The men were riding on the engine and tender; a rail pushed through the fire box into the boiler, releasing the steam. Fourteen were scalded, of whom nine died.

November 14, 1884. Wreckers removed a rail at Clear Creek station, near Hempstead, Texas. A passenger train on the Houston and Texas Central Railroad was derailed and the train plunged into the creek. Nine persons were drowned or crushed, and fifteen injured.

January 20, 1885. Collision of freight trains on the Nickel-Plate Road near Grand Crossing, resulting in the death of engineer Elles and about $20,000 damage to property.

February 8, 1885. Accident near Creston, Iowa; collision; six lives lost and many injured.

June 10, 1885. Train wrecked near Chattanooga, Tennessee. Six lives lost and thirteen injured.

December 15, 1885. Catastrophe near Austell station, Georgia. Fourteen persons killed.

April 7, 1886. Wreck on the Fitchburg Railroad near Springfield, Mass. Ten persons killed.

September 14, 1886. Collision near Silver Creek, on the Nickel-Plate Road, N. Y. Seventeen lives sacrificed.

October 28, 1886. Railway wreck at East Rio, Wisconsin, owing to a neglected switch; on the Chicago, Milwaukee and St. Paul Railroad. Eighteen persons killed, including three sisters of mercy, and several injured.

January 5, 1887. Accident near Republic, 3½ miles from Tiffin, Ohio. The Baltimore and Ohio fast train from New York crashed into a freight train that had given out on an up-grade; fire ensued; fifteen persons were burned to death and about twelve injured.

February 5, 1887. Catastrophe on the Central Vermont Railroad, four miles north of White River Junction. A broken rail threw the train on to the ties, so that it was not on the rails when it reached the bridge. The train crashed through the bridge, falling sixty feet; the cars took fire; thirty-two were killed, being mostly burned to a cinder, whilst over forty were injured.

February 26, 1887. On the Atlantic and Pacific Railroad a passenger train went through a culvert; the wreck caught fire; four persons were burned to death and one fatally injured.

March 15, 1887. At Bussey Bridge, on the Dedham branch of the Boston and Providence Railroad, the bridge is over a highway at an elevation of forty feet. The train was derailed by a broken rail and the bridge gave way; twenty-six persons were killed and one hundred wounded.

March 26, 1887. Accident to the Chicago express, on the Pittsburg and Fort Wayne Road, near Leetonia, Ohio. A freight train came up, causing a rear-end collision; two persons were fatally, and a number seriously, injured.

August 11, 1887. A special excursion train of twenty cars with 950 people on board was wrecked by a burning culvert, at a point three miles east of Chatsworth, Ill., on the Toledo, Peoria and Western Railroad. Over one hundred persons were killed and as many more seriously injured.

SOME NOTABLE SHIPWRECKS.

President, steamer, from New York to Liverpool, with many passengers on board, sailed on March 11, 1841, and encountering a terrific storm two days afterwards was never heard of again. In this vessel was Mr. Thomas Power, the comedian.

Independence, was in 1853 wrecked on the coast of Lower

A SHIPWRECK.

California, and afterwards took fire; 140 persons drowned or burned to death, a few escaping, who underwent the most dreadful sufferings on a barren shore.

Arctic, United States mail steamer, collided in a fog with *Vesta,* a French steamer, off Newfoundland; over 300 lives lost, September 27, 1854.

Northern Belle, American vessel, wrecked near Broadstairs. The American government sent twenty-one silver medals and $1,350 to be distributed among the heroic boatmen who saved the crew, January 6, 1857.

Central America, American steamer, from Havana to New York, foundered at sea; had on board 579 persons, of whom only 152 were saved; also $2,000,000 in gold, which was lost. September 12, 1857.

Pomona, an American ship, from Liverpool to New York; only twenty-four persons saved out of 419. April 28, 1859.

Royal Charter, British, on the Anglesea coast, 446 lives lost, and nearly $4,000,000, much of which has been recovered. October 26, 1859.

Lady Elgin, steamer, sunk through collision with schooner *Augusta* on Lake Michigan; 287 lives lost. September 8, 1860.

Canadian, steamer, struck on a field of ice in the straits of Belle Isle and foundered in half an hour; thirty-five lives lost. June 4, 1861.

Constitution, steamer, wrecked on Cape Lookout shoals; forty lives lost. December 25, 1865.

Miami, steamer, exploded boilers, burned, and sunk in the Mississippi river; 150 lives lost. January 30, 1866.

Missouri, exploded her boilers on Ohio river, 100 lives lost, January 30, 1866.

General Grant, on voyage from Melbourne to London, wrecked off Auckland Isles; only thirteen out of 100 saved, May, 1866.

Evening Star, steamer, from New York to New Orleans foundered at sea; about 250 lives lost, October 3, 1866.

Magnolia, exploded boilers on Ohio river; eighty lives lost, March 18, 1868.

Sea-bird, steamer, burned on Lake Michigan, 100 lives lost, April 9, 1868.

United States and *America,* steamers on Ohio river, near Warsaw, Kentucky; in collision and burned; heavy loss of life, December 4, 1868.

Missouri, steamer, New York to Havana, burned at sea; thirty-two lives lost, August 24, 1872.

Wawasset, steamer, burned on Potomac river, seventy-five lives lost, August 8, 1873.

George Wolfe, exploded on Mississippi river; thirty lives lost, August 23, 1873.

Pat Rogers, steamer, burned on Ohio river; fifty lives lost, July 26, 1874.

St. Clair, steamer, burned on Lake Superior; twenty-seven lives lost, July 10, 1876.

Loss of twelve American whaling-ships in Arctic ice, reported by whaling-bark *Florence;* immense loss of life, October 12, 1876.

News received at Gloucester, Massachusetts, of the loss of fourteen Gloucester fishing-schooners, with fifty lives, January 11, 1877.

George Washington, steamer, foundered off Cape Race; twenty-five lives lost, February 5, 1877.

Huron, United States sloop of war, wrecked on coast of North Carolina; about 100 lives lost, November 24, 1877.

Narragansett and *Stonington,* steamers, in collision on Long Island Sound; the former sunk; thirty lives lost, June 11, 1880.

Seawauhaka, steamer, burned in East River, New York harbor; fifty lives lost, June 28, 1880.

Mamie, steam-yacht, cut in two by steamer *Garland,* in Detroit river; sixteen lives lost, July 22, 1880.

Marion City, steamer, burned on Lake Huron; ten lives lost, August 29, 1880.

CLOCKS AND HOROLOGY.

The clypsedra, or water-clock, was introduced at Rome 158 B.C., by Scipio Uasica; toothed wheels were applied to them by Clesibius, about 140 B.C. Clocks said to have been found by Cæsar on invading Britain, 55 B.C. The only clock supposed to be then in the world was sent by Pope Paul I. to Pepin, King of France, A.D. 760. Pacificus, archdeacon of Genoa, invented one in the ninth century. Originally the wheels were three feet in diameter. The earliest complete clock of which there is any certain record was made by a Saracen mechanic in the thirteenth century. Alfred the Great is said to have measured time by wax tapers, and to have used lanterns to defend them from the wind, about 887.

The escapement ascribed to Garbert, A. D. 1000, a great clock put up in Canterbury Cathedral, cost $150—1292. John Visconti set up one at Genoa, 1353 ; a perfect one at Paris by Vick, 1370 ; the first portable one made, 1530. In England no clock went accurately before that set up at Hampton Court, 1540.

> " . . . Like a German clock—
> Still a-repairing ; ever out of frame ;
> And never going aright."
>
> *Shakespeare, Love's Labor Lost—1598.*

The pendulum is said to have been invented by the younger Galileo, 1639 ; Christian Huyghens claims the invention, 1658 ; repeating clocks and watches invented by Barlow, about 1676 ; spiral pendulum spring invented by Robert Hooke, about 1658 ; church clocks illuminated, 1826; electric system of synchronizing clocks, 1878.

WATCHES.

Watches are said to have been first invented at Nuremberg, 1447; but it is affirmed that Robert, King of Scotland, had a watch, 1310. Authors assert that the emperor Charles V. was the first that had anything that might be called a watch, though some call it a small table clock, 1530. Spring pocket watches

have had their invention ascribed to Dr. Hooke, 1658. Repeating watches invented by Barlow, 1676. Harrison produced his first timepiece for determining the longitude at sea in 1735.

THE TELESCOPE.

It is very natural to associate the telescope with astronomy, for without it we should know comparatively little of the wonders of the heavens. Galileo appears to be justly entitled to the honor of having invented that form of telescope which bears his name. The interest excited at Venice by Galileo's invention amounted almost to a frenzy. On ascending the tower of St. Mark that he might use one without molestation, he was recognized by a crowd in the street, who took possession of the wondrous tube and detained the impatient philosopher for several hours, until one after another had made experiment of its effects. These instruments were soon manufactured in great numbers, but were purchased merely as philosophical toys, and were carried by travelers into every corner of Europe.

Galileo's telescope was constructed with a leaden tube a few inches long, with a spectacle glass, one convex and one concave, at each end of its extremities. It magnified three times. He improved on his first success until he could magnify a thousand times and bring objects thirty times nearer. Telescopes were made in London in 1610, a year after Galileo had completed his.

Newton produced his reflecting telescope in 1668; it was examined by Charles II., and presented to the Royal Society in 1671, and is still preserved, bearing this inscription; "The First Reflecting Telescope; invented by Sir Isaac Newton, and made with his own hands."

Sir William Herschel greatly improved telescopes; he discovered the planet Uranus in 1781, and a volcanic mountain in the moon in 1783; he completed his forty feet focal length telescope in 1789, and in that year discovered two other volcanic mountains. *The very first moment* his great telescope was directed to the heavens a new body was added to the solar system, namely, Saturn, and six of its satellites. The cost

of its construction was $20,000, and was paid by George III.

In 1805 a telescope was made in London for the observatory in Madrid, costing $44,000.

In 1828 the Earl of Rosse erected at Parsonstown, Ireland, a telescope six feet in diameter, and fifty-four feet in length, which can be moved with ease; it cost $100,000. Sir David Brewster sketches the powers of this wonderful instrument as follows: "We have in the morning walked again and again, and ever with new delight, along its mystic tube, and at midnight, with its distinguished architect, pondered over the marvelous sights which it discloses,—the satellites, belts and rings of Saturn,—the old and new ring, which is advancing with its crest of waters to the body of the planet,—the rocks and valleys and mountains and extinct volcanoes of the moon,—the crescent of Venus, with its mountainous outline,—the system of double and triple stars,—the nebulæ and starry clusters of every variety of shape,—and those spiral nebular formations which baffle human comprehension, and constitute the greatest achievement in modern discovery."

In 1860 magnificent equatorial telescopes were set up in the national observatories at Greenwich, England, and at Paris; and in 1870 a telescope thirty-three feet in length, with an object-glass twenty-six inches in diameter, was erected at the United States observatory, Washington. The largest refracting telescope yet made, by Howard Grubb, at Dublin, for Vienna, was finished and approved of in 1881. Hooke is said to have proposed the use of telescopes having a length of upwards of ten thousand feet (or nearly two miles), in order to see animals in the moon. Such an idea is evidently absurd; but considering the vast results which have been attained, in a comparatively short time, there is almost no limit to what in this direction science may yet accomplish. All honor to the men whose extraordinary devotion and industry, as well as genius, have already carried us on so far.

ORIGIN OF THE LOCOMOTIVE.

The first steam carriage seems to have been made by a Frenchman, Cugnat, in 1769—the year that witnessed the birth of Napoleon I., Wellington, Humboldt, Mehemet Ali, the first patent of Watt, the first patent of Arkwright. William Murdock, the able assistant of Watt, made a miniature steam carriage in 1784, which is still extant.

Hero, of Alexandria, in his writings describes various methods of employing steam as a power; and to him is ascribed the æolopile, which, although a toy, possessed the properties of the steam engine. He flourished about 284–241 B.C. Roger Bacon, who died 1292, appears to have foreseen the application of steam power. The first idea of steam navigation was set forth in a patent obtained by Jonathan Hulls, in 1736. Watt's invention of performing condensation in a separate vessel from the cylinder, bears date 1765; Thomas Paine proposed steam navigation in America, 1778; first experiment with steam navigation on the Thames, 1801; Fulton's steamboat *Clermont* on the Seine, August 9, 1803; at New York, 1806; started a steamboat on the Hudson, 1807; *Comet*, built by Henry Bell, sailed on the Clyde, Scotland, 1812; steam applied to printing the *Times*, London, 1814; *Rising Sun*, a steamer, built by Lord Cochrane, crossed the Atlantic; the *Savannah*, a steamer of 350 tons, sailed from New York to Liverpool in twenty-six days, 1819; steam-gun invented by Perkins in 1824; Trevethick and Vivian obtained a patent for a high-pressure *locomotive* engine, 1802; the first *locomotive* constructed by George Stephenson traveled at six miles an hour, 1814; Quincy railroad, first in United States, begun 1825, finished 1826; first locomotive built in America, by Peter Cooper, in Baltimore, 1830; a climbing locomotive, by means of central rails, ascended Mount Cenis (Switzerland) in 1865; Rigi mountain railway (up to 4,000 feet above sea level) 1871; first railway in Japan opened 1872; elevated street railways erected in New York City, 1877–8; first railway in China, from Shanghai to Oussoon (eleven miles), 1877–8.

TRAMWAYS.

The first horse railroad in the world was opened on Fourth Avenue, New York, 1832.

GREAT EXHIBITIONS.

Industrial exhibitions were begun by the French, an exposition having been organized and opened at Paris, in 1798. It was followed by ten others, the last in 1849 exceeding all the preceding in extent and brilliancy. The Great Exhibition of 1851, at London, is associated especially with the name of Prince Albert. In proposing it he said, "Now is the time to prepare for a great exhibition,—an exhibition worthy of the greatness of the country; not merely national in its scope and benefits, but embracing the whole world; and I offer myself to the public as their leader." The exhibition was open 144 days, and was visited by 6,170,000 persons. Exhibitions, or expositions, have since been held in many places, including Paris, New York, Vienna, Montreal, Constantinople, and Melbourne.

The Centennial Exhibition at Philadelphia, Pa., 1876, was international in character, and was opened by the President in the presence of the Emperor and Empress of Brazil, and 130,000 persons. It was the most extensive of all exhibitions up to that time; the vista extended 1,980 feet, or three-eighths of a mile; about 80,000 persons were admitted by payment daily during September. It was opened May 10, and closed November 10. Total admitted, 9,789,392; daily average, 61,568; receipts, $3,813,749.

The International Exhibition at Paris, in 1878, had its site on two unequal parts, divided by the Seine. The main building on the Champ-de-Mars covered 263,593 square yards (765 by 360). The exhibition was opened by the President, Marshal McMahon, "in the name of the Republic," in presence of a brilliant assembly. On one fête day (August 15) 111,955 visitors were admitted. It was opened May 1 and closed November 10. Total admissions, 16,032,725; daily average,

82,000; gross receipts, 12,653,746 francs (franc equals twenty cents).

GAS-LIGHTS.

The application of coal gas to illuminate was attempted in Cornwall, England, in 1792; introduced into a foundry in Birmingham in 1798; used in a theater, 1803; London lighted with gas, 1814–20; New York, 1823–4. The first gas meter was patented in 1820.

EXPRESS BUSINESS IN CHICAGO.

The modern express is a wonderful institution, and comparatively few people are aware of the immense amount of business it does and the many purposes it serves. It carries freight, valuables and money with speed and security; collects money for packages; sends perishable goods out in consignment; pays money by telegraph; issues money orders; buys goods in distant markets; collects notes or drafts; pays taxes; secures signatures to important documents, and returns the papers.

In Chicago there are 225 wagons, and 500 horses, engaged all day in delivering parcels; twelve small wagons dealing with money and valuables; 1,000 men handle and sort the traffic; and every day 100 messengers arrive from different quarters with freight.

Less than fifty years ago there was only one expressman in America; now in the United States there are 30,000 express offices. The Expressman's Benefit Association, a most valuable and provident undertaking, has already paid nearly $300,000 to the widows and orphans of deceased members.

CHAPTER XV.

BUSINESS TERMS.

ACCEPTANCE. A draft drawn on a party and by him indorsed on the face with his agreement to pay it when due.

Acquittance. A discharge in full.

Ad valorem. In proportion to value.

Assets. Funds or effects.

Assignment. A transfer of property on certain conditions for stated purposes.

Assignee. A person to whom anything is assigned.

Assignor. The person who assigns.

Balance. Difference between two statements or accounts.

Bankrupt. A person unable to pay his debts.

Bill of Exchange. An order for money to be paid.

Bill of Sale. A contract signed and sealed for the sale of personal property.

Bills Payable. Name given to notes made and to be paid by a party.

Bills Receivable. Notes made and to be paid to a party.

Bond. An instrument or deed providing a money security.

Check. An order on a bank for the payment of money.

Capitation. A tax on every male who is of age.

Commission. The amount or proportion charged by an agent in a business transaction.

Company. An association for transacting business.

Consideration. The sum of money or thing for which a transaction is made.

Consign. To send goods, etc., to a party.

Consignee. One to whom goods are consigned.

Consignor. One who consigns goods.

Contract. A bargain or agreement

Conveyance. A document transferring property.

Days of Grace. Three days legally allowed beyond the date for payment.

Debit. To make debtor in an account or books.

Discount. A sum taken from a bill or note.

Dividend. Interest on stock investments, etc.

Draft. An order for the payment of a certain sum.

Drawer. One who draws a draft, etc.

Drawee. The person on whom the draft is drawn.

Executor. One appointed to carry out the provisions of a will.

Exhibit. A writing or official statement.

Mortgageor. One giving such a conveyance.

Mortgagee. One to whom such a conveyance is given.

Net. The amount remaining after making all deductions.

Par Value. The face value.

Payee. The person to whom a payment is due.

Protest. A notary's official notice of non-payment of a note, draft or check.

Rebate. A reduction in consideration of prompt payment.

Salvage. Compensation for assistance in saving a vessel.

Schedule. An inventory.

Set-off. A claim offsetting a debt.

Sight. The time when a draft is presented.

Suspend. To stop payment.

Silent Partner. One who furnishes capital but whose name does not appear in a firm.

Sterling. The British standard of coinage.

Scrip. A certificate of joint stock.

Staple. A standard commodity or production.

Teller. A bank official who pays out and receives money.

Voucher. A document proving a receipt or other fact.

Face. The sum named in a note, etc.

Foreclose. To deprive a mortgageor by legal process of his right of redemption.

Gross. Entire, as gross receipts. Twelve dozen.

Guarantee. A security

Honor. To accept and pay a note, draft, etc.

Hypothecate. To make a security of.

Indorsement. A signature on the back of a bill, note, etc.

Insolvent. Unable to pay all debts.

Interest. A certain proportion of a sum as profit; a share.

Inventory. A catalogue, or list.

Joint Stock. Stock held by more than one person, or in company.

Judgment. Decree of court to pay in a suit.

Legal Tender. Money decreed by the government to be legal and a proper means of payment.

Letter of Credit. A letter giving a certain credit to a person named therein.

Letters Patent. A written instrument granting certain rights and powers.

Letters of Administration. The instrument granting authority to administrators.

Lien. A valid claim by reason of some debt.

Liquidation. The settlement and adjustment of accounts.

Maturity. The time when a payment is due.

Mortgage. A conditional conveyance of property giving a right of redemption.

TABLES OF WEIGHTS, MEASURES, TIME, ETC.

WEIGHTS.—TROY

24 grains (gr.)	1 pennyweight
20 pwt.	1 ounce
3.2 grains	1 carat, diamond weight

Gold, silver and jewels only weighed thus. The ounce and pound same as in apothecaries' weight.

LONG MEASURE.

3 barley corns	1 inch
12 inches	1 foot
3 feet	1 yard
5½ yards	1 rod
40 rods	1 furlong
8 furlongs	1 mile

APOTHECARIES'

20 grains....................1 scruple.
3 scruples...................1 drachm.
8 drachms...................1 ounce.
12 ounces...................1 pound.

AVOIRDUPOIS.

16 drachms..................1 ounce.
16 ounces....................1 pound.
*25 lbs.......................1 quarter.
4 qrs.........................100 weight.
20 cwt........................1 ton.

*Only the coal mines of Pennsylvania, the eastern fishmarkets and the U. S. Custom House still adhere to 28 lbs. in the quarter.

MEASURES.—DRY.

2 pints (pts.)................1 quart.
8 quarts......................1 peck.
4 pecks.......................1 bushel.
36 bushels....................1 chaldron

1 U. S. stand'rd (Winchester) bushel 18½ inches in diameter and 8 inches deep, contains 2,150.4 cubic inches.

LIQUID OR WINE.

4 gills.......................1 pint.
2 pints.......................1 quart.
4 quarts......................1 gallon.
31½ gallons...................1 barrel,
2 barrels.....................1 hogshead.
U. S. standard
Gallon.......231 cubic inches.
Beer ".........231 " "
31 gallons....................1 bbl.

OTHER LIQUIDS.

1 gallon oil weighs 9.32 lbs. avoir.
1 " distilled water weighs 8.35 " "
1 " sea water " 10.32 " "
1 " proof spirits " 9.08 " "

SQUARE MEASURE.

144 square inches.........1 sq. foot
9 sq. ft....................1 sq. yard
30¼ sq. yds................1 sq. rod
40 sq. rods.................1 sq. rood
4 roods.....................1 acre.

SURVEYORS'.

7.92 inches.................1 link
25 links....................1 rod
4 rods......................1 chain
10 sq. chains } ....1 acre
160 sq. rods }
640 acres...................1 sq. mile

CUBIC MEASURE.

1728 cubic inches.....1 cubic foot
27 " feet..........1 " yard
128 " "..........1 cord [wood]
40 " ".......1 ton [shipping]
2150.4 " inches..1 standard bushel
268. 8 " ".....1 " gallon
1 " foot....4-5 of a bushel.

To find the number of bushels in a bin of any dimensions, find the number of cubic feet by multiplying the three dimensions of the bin in feet; deduct one-fifth and the result is the number of bushels.

CLOTH MEASURE.

2¼ inches...................1 nail
4 nails.....................1 quarter
4 quarters..................1 yard

MISCELLANEOUS.—IRON, LEAD, ETC.

14 lbs......................1 stone
21½ stones..................1 pig
8 pigs......................1 fother

TIME.

60 seconds................1 minute
60 minutes.................1 hour
24 hours....................1 day
7 days....................1 week
4 weeks............1 lunar month.
February has 28 days except in leap year when it has 29. April, June, September and November 30, all the others have 31 days.
52 weeks and one day } .....1 year
12 calendar months }
365 days, 5 hours, 48 minutes and 49 seconds............1 solar year.

CIRCULAR OR ASTRONOMICAL MEASURE.

60 seconds..... ....1 minute
60 minutes... ....1 degree
30 degrees.................1 sign
90 degrees.............1 quadrant
4 quadrants............1 circle.

BEEF, PORK, ETC.

200 lbs....................1 barrel
196 lbs. [flour]............1 barrel
100 lbs. [fish]............1 quintal

3 inches.. .... 1 palm
4 "....................1 hand
9 ". ....1 span
18 "............. ......1 cubit
21.8 "...............1 bible cubit
2½ feet...........1 military pace
3 "............1 common pace

PAPER COUNTS.

24 sheets.................1 quire
10½ quires...............1 token
20 "..... ....1 ream
2 reams.................1 bundle
5 bundles.................1 bale.

GROSS AND GREAT GROSS.

12 dozen..................1 gross
12 gross............1 great gross.

STANDARD MEASURES OF THE UNITED STATES.

The Standard Gallon measures 231 cubic inches, capable of holding 8.339 pounds avoirdupois distilled water at its maximum density, 39.83 degrees Fahrenheit and 30 inches barometer weight.

The Standard Bushel measures 2,150.4 cubic inches=77.627,-413 pounds avoirdupois distilled water at the same temperature and barometer; its dimensions are 18½ inches inside diameter, 19½ inches outside and 8 inches deep. When heaped the cone must not be less than 6 inches high.

The Standard Pound avoirdupois is the weight of 27.7015 cubic inches distilled water under the same conditions and weighed in the air.

TO MEASURE A CIRCLE.

Multiply the diameter by 3.1416 for the circumference. To

find the diameter from the circumference multiply the latter by .31831. The square of the diameter multiplied by .7854 equals the area. The square of circumference multiplied by .07958 equals the area.

HOW MANY TONS IN A LOAD OF HAY.

Multiply the length, breadth and height together in yards and divide by 20.

THE NUMBER OF CORDS OF WOOD IN A PILE.

Multiply together the length, breadth and height and divide by 128.

MEASURING TIMBER.

To find the number of cubic feet in round timber, add the circumference of the larger and smaller ends and divide by two; multiply the square of one-fourth of the result by the length in feet; you have then four-fifths of the contents in cubic feet; one-fifth being usually allowed for waste in sawing.

MEASUREMENT OF LUMBER.

Multiply length in feet by breadth in inches and divide by 12 for inch boards; the quotient gives contents in feet. For boards 1¼ inches thick, add one-quarter to the quotient; if 1½, add one-half; if 2 inches thick, divide by 6 instead of 12; if 3 inches, divide by 4, and so on.

SIZES OF PAPER, CARD BOARD, ETC.

Letter	10x16	Folio Post	17x22
Flat Cap	14x17	Medium	18x23
Crown	15x19	Royal	19x24
Demy	16x21	Card Board	22x28

Colored medium cover paper 20x25.

Glazed and plated cover paper 20x24.

SIZES OF BOOKS.

Books now are nearly all made up, of whatever size, of a number of "signatures" which consist of a sheet folded so as to make

8 leaves or 16 pages. Formerly, however, there were designations universally recognized which it is still of some importance to be acquainted with. *Folio* size was obtained by folding a sheet in 2 leaves; *quarto*, or 4to, by folding in 4 leaves; *octavo*, or 8vo, in 8 leaves; *Duodecimo*, or 12mo, in 12 leaves. *Sixteenmo*, or 16mo, in 16 leaves. The names are still retained to designate books, though the reason for them has ceased.

TERM PENNY AS APPLIED TO NAILS.

The term *penny* as applied to nails is generally supposed to have been derived from pound. It originally meant so many pounds to the thousand; that is, six-penny means six pounds of nails to the thousand, ten penny, ten-pounds to the thousand, and so on. We have here an example of the tendency gradually to abbreviate expressions until they are altered beyond recognition.

SHORT RULES FOR CASTING INTEREST.

For finding the interest on any principal for any number of days, the answer in each case being in cents. Separate the two right hand figures to express it in dollars and cents:

Four Per Cent.—Multiply the principal by the number of days to run; separate the right hand figure from the product, and divide by 9.

Five Per Cent.—Multiply by number of days, and divide by 72.

Six Per Cent.—Multiply by number of days; separate right hand figure and divide by 6.

Seven Per Cent.—To find the interest on any sum at 7 per cent., take the interest given by the tables at 6 per cent., add ONE-SIXTH to that amount, and you have the interest at 7 per cent.

Eight Per Cent.—Multiply by number of days; divide by 45.

Nine Per Cent.—Multiply by number of days; separate right hand figure and divide by 4.

Ten Per Cent.—Multiply by number of days, and divide by 36.

Twelve Per Cent.—Multiply by number of days; separate right hand figure and divide by 3.

Fifteen Per Cent.—Multiply by number of days, and divide by 24.

Eighteen Per Cent.—Multiply by number of days; separate right hand figure and divide by 2.

Twenty Per Cent.—Multiply by number of days and divide by 18.

A short way for reckoning interest on odd days, at any rate per cent., is as follows: Multiply the principal by the number of days, and for 6 per cent., divide by 60; for 7 per cent., by 51; for 8 per cent., by 45; for 9 per cent., by 40; for 10 per cent., by 36; for 12 per cent., by 30.

TAKING OUT PATENTS.

Preliminary Examination.—Whenever an invention has been made, the question arises whether the same be patentable or not. This can best be ascertained to a reasonable degree of certainty by a preliminary examination or search in the United States Patent Office at Washington. A sketch or rough model and a brief description of the invention is required. The preliminary examination serves to disclose the state of the art, but constitutes no guarantee that a patent will be finally obtained, as additional references may be discovered by the Patent Office. Expense, $5.

Caveats.—In some cases it is desirable to obtain a provisional protection for an invention which is not quite completed, for the purpose of establishing priority and securing time for improving the invention. The caveat (from the Latin, "Beware,") is entered in the Secret Archives of the Patent Office, and a certificate of registration granted therefor. It entitles the caveator to notice from the Patent Office in case any other party files an application for a patent for the same invention. The duration of the caveat is one year. The government fee is $10.

Patents.—Whenever an invention is completed and represented by a drawing, or embodied in a model, the application for a patent should be made. No models are required by the Patent Office, except when specially called for by the examiner for the better understanding of the case, or for demonstrating the principle of the invention. To prepare the proper application papers, a full description, together with drawings or a model, are required. When the papers are prepared, they are submitted to the inventor for signature and oath. By the United States Patent Laws, the inventor only can make the application, and no one else for him or with him. But he may interest other parties in his invention by assignment *before* or *after* the patent is granted. When the papers are properly executed, they are filed in the Patent Office and prosecuted until passed for allowance. When the application is filed in Patent Office, a government fee of $15 has to be paid. The agency fee for preparing the case and prosecuting it before the Patent Office is $30 for simple cases and proportionately more for complicated cases. When the application has been allowed by the Patent Office, a final fee of $20 has to be paid within six months from the date of allowance. The total expense of a patent is usually $65. The patent is granted for seventeen years from date of issue. When an invention, upon examination, is found to be anticipated by reference to prior patents or applications, it is rejected partly or entirely by the Patent Office; it is then amended until passed for allowance, or finally rejected. In the latter case appeal may be taken. When a case is allowed and the final fee paid into the Patent Office, it takes about three weeks to have the patent printed and issued. After issue, printed copies of any patent can be obtained at twenty-five cents per copy.

Appeals.—The patent laws provide for several appeals: first, from the final adverse decision of the Primary Examiner to the "Board of Examiners-in-Chief," then to the Commissioner, and finally to the Supreme Court of the District of Columbia.

These appeals are subject to government fees respectively of $10.00, $20.00 and $25.00. By these different steps any casual error may be remedied, and justice obtained for the inventor.

Renewals.—An application which has lapsed for non-payment of the final fee within the six months allowed by law, may be renewed within two years from the date of allowance by payment of a new filing fee of $15.

Re-issues.—In case a patent is found to be defective, or the claims not sufficiently broad in their scope to cover the invention properly, a re-issue may be applied for, so as to obtain a new and better patent in place of the old one, which has to be returned for cancellation. This has to be done as soon as possible after the defect is discovered, and when the scope of the patent is to be enlarged, *within two years* from the date of the patent. The government fee for a re-issue is $30.00.

Designs.—Patents are also granted for new designs, original configurations and ornamental forms of articles of manufacture. To make a design application, twelve photographs of the design have to be furnished. It may be taken for three, seven or fourteen years, the government fee being respectively, $10.00, $15.00 and $30.00. The time is optional, but cannot be extended.

Assignments.—Patents for invention and designs, trademarks, labels and copyrights can be assigned. To be valid against subsequent bona-fide purchasers, the assignment has to be recorded in the Patent Office or in the office of the Librarian of Congress as the case may be. The expense of an assignment, including record fee, is usually $5.00.

Interferences and Infringements.—An *Interference* is a proceeding before the Commissioner of Patents to determine the priority between different applicants or a patentee and a later applicant. *Infringement* is the violation of the rights granted by Letters-patent.

CUSTOMS OBSERVED IN THE SALE OF GRAIN, FLOUR, ETC.

America.—In both the United States and Canada, the Winchester bushel is the measure of capacity, being equal to 0.96944 imperial bushel.

Amsterdam.—Grain is sold by weight. A last of wheat contains 2,400 kilogrammes, a last of rye 2,100 kilos. Payment in sixty days with 1 per cent discount, and $1\frac{1}{2}$ per cent discount for cash. For the sale of rye two rules have been established. The first came into operation in November, 1859, and according to this all rye has to be sold by weight, dried rye counting 60 kilos. to the hectolitre, and undried 70—payable net on delivery. The second dates from December, 1859, and according to this, rye must be sold by weight or measure, the prices being so much per last of 2,100 kilos. net. Payments, cash with 1 per cent discount. Quotations are given in guldens.

Antwerp.—Grain is sold by the 100 kilos.; flour by the barrel of 196 pounds. The quotations are given in francs.

Australian Colonies.—In the Australian Colonies flour is sold by the 100 pounds, and by the ton of 2,000 pounds; and wheat per bushel.

Berlin.—Grain is sold here per 1,000 kilos., flour per 100 kilos., gross weight sack included. On supply, wheat is sold by the litre of 713 grains, payment within eight days. Rye is sold in lots of 50,000 kilos., and is quoted at so much per 1,000 kilos. Rye flour is quoted per 100 kilos., sack included. The prices are quoted in marks. 1,015 kilos. are equal to 2,240 pounds.

Breslau.—Here grain is sold by the 1,000 kilos., and flour by the 100 kilos. In buying on supply, wheat is contracted for in lots of 50,000 kilos., payment one day after demand. Rye is contracted for in the same way as wheat. Quotations in marks.

Cape of Good Hope.—Flour is sold at per 100 pounds, and wheat by the bushel, or per 200 pounds.

Dantzic.—Here grain is sold by the ton of 2,000 German pounds, or per 1,000 kilos. The zollpfund is the unit of weight and is equal to half a kilo. or 500 grammes. One pound

avoirdupois is equal to 0.907 zollpfund, and one zollpfund is equal to 1.10233 pounds avoirdupois. Dantzic was the first town to adopt the kilo. system.

Frankfort-on-the-Main.—Grain is quoted at so many marks per 100 kilogrammes.

Hamburg.—Grain is quoted at so many marks per 1,000 kilogrammes; flour, per 100 kilogrammes.

Cologne.—Grain quotations, so many marks per 200 German pounds. On supply, wheat counts 75 pounds, rye 69 pounds per scheffel = 50 litres. Payments generally cash on delivery.

Egypt.—In Egypt, the measure of capacity is the Ardeb.

2 Rubba = 1 Quelch.	6 Wehbih = 1 Ardeb.
2 Quelch = 1 Wehbih.	2 Ardeb = 1 Daribba.

In Alexandria the Ardeb = 7.4457 British imperial bushels, or 271 French litres. In Cairo the Ardeb = 4.92461 British imperial bushels, or 179 French litres. In Nubia the Ardeb = 5.00699 British imperial bushels.

Germany.—Throughout the German Empire grain is sold wholesale at per 1,000 kilos., and retail per 100 kilos.

Greece.—Here the measure for capacity for dry goods are the litra and the koilo. 100 Litra = 1 Koilo = $2\frac{3}{4}$ imperial bushels.

India.—At Calcutta all contracts for wheat are made by the bazaar maund—2,730 bazaar maunds of 82 pounds each, equaling 100 tons English.

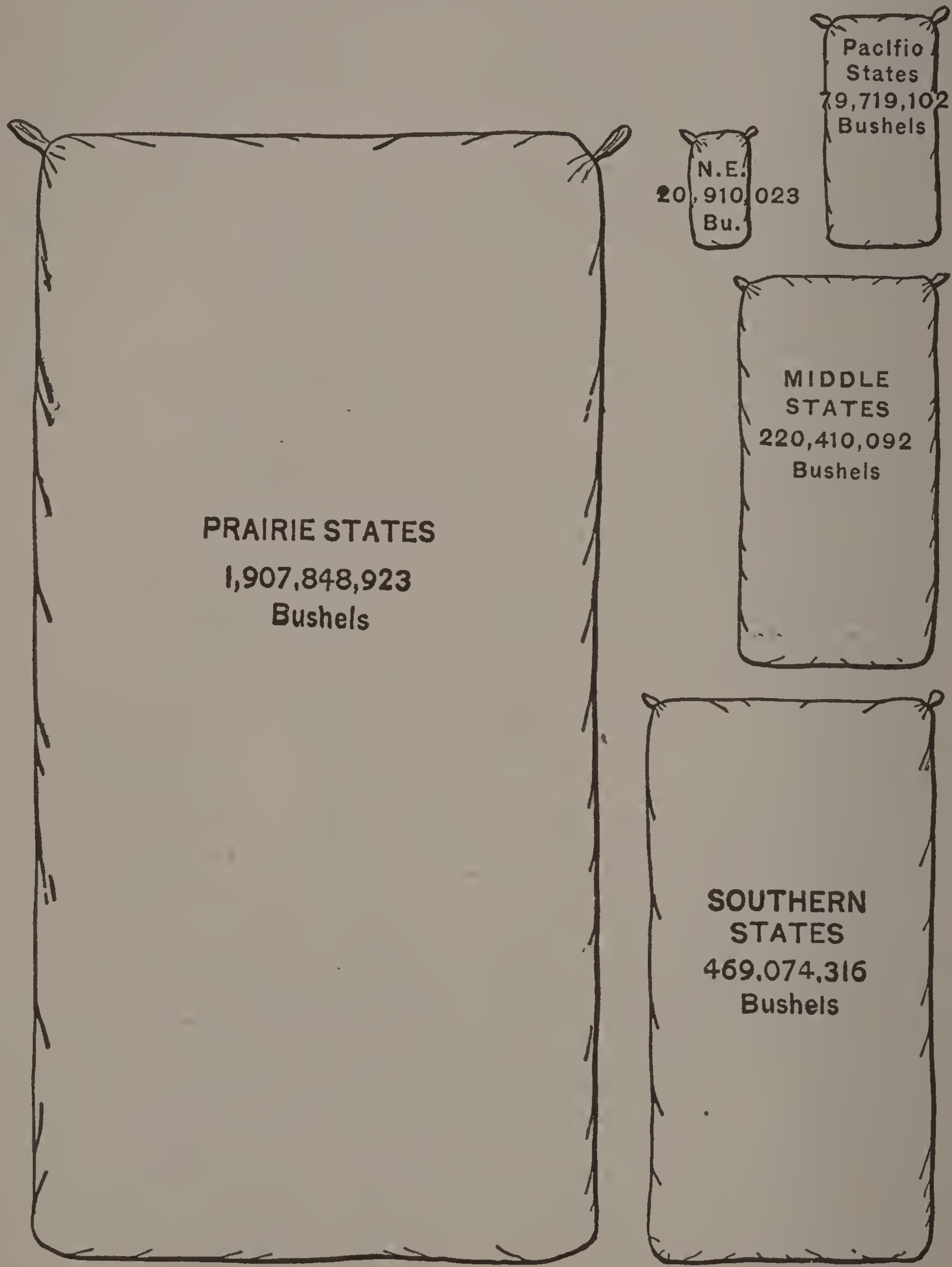
London.—English wheat is sold by the imperial quarter, and foreign by the quarter of 480,496, and 504 pounds, according to the country from which it comes. Flour is sold by the 280 pounds in sacks, and 196 pounds in barrels.

Liverpool.—Wheat is sold by the 100 pounds; flour, per 280 pounds. In 1860 a resolution was adopted to sell all kinds of grain and flour by the 100 pounds, which was adhered to only in the case of wheat; but a resolution was passed at a large meeting held in Liverpool on Tuesday, October 8, 1878, to adopt the cental of 100 imperial pounds from the first of January, 1879, by which all grain, flour and meal should in future be sold.

Paris.—Everything is sold by the 100 kilos.

Comparative Diagram Showing

CEREAL PRODUCTS OF DIFFERENT DIVISIONS OF UNITED STATES.



Persia.—Here the measure of capacity is the artata; 8 collothun=1 artata=1.809 imperial bushels.

Portugal.—The same as in France, Italy and Switzerland.

Pesth.—Wheat was formerly quoted at so many Austrian gulden per one hundred pounds, or 50 kilos.; but lately new weights and measures have been introduced, similar to those of France.

Russia.—In the north of Russia all grain is sold per tschetwert (Riga excepted, where the pood is in use). A tschetwert is a measure, 100 of which equal 72 imperial quarters. In selling wheat per tschetwert, it is understood that 10 poods have to be delivered, and of rye, 9 poods *net*. Barley and oats as they measure. In Riga and Black Sea ports, everything is sold per pood of 40 Russian pounds. One pood is equal to 36 pounds English.

Spain.—Here the weights and measures are exactly the same as those of France. The motro is the metre; the litro the litre; the gramo is the gramme; the area is the *are*, and the tonclado is 10 metrical quintals of 100 kilos. each. The metric system came into operation in 1859. It is also the legal system for all the Spanish colonies.

CHAPTER XVI.

THE CHICAGO CLEARING HOUSE.

NEW YORK, being the financial center, régularly makes three-fourths of the bank clearings of the country; but if it depended on commercial clearings alone, it would do no more than double the business of Chicago. Boston Clearing House depends largely on that city being the headquarters for many great railroads and insurance corporations, whose actual business is transacted in the Middle and Western States. New York's clearings far excel those of London, whilst those of Chicago are nearly as large, and three times greater than those of Paris. The Chicago Clearing House was established in 1865 with less than a dozen banks as members. Now there are twenty banks, and many others effect their clearings through those that are members. The capital represented by those twenty banks is \$17,000,000; their deposits, \$87,000,000. In the first year of its existence the Chicago Clearing House settled \$450-000,000 of exchange, or \$1,500,000 per day; in 1873 \$1,000,000-000 was reached; and in 1883, \$2,517,371,481.

MODE OF WORKING.

In Chicago, twenty banks or more have settlements each day to make with each other, in consequence of having each had paid into them the checks of the other banks. Instead then of each individual bank sending to all the others with their checks, in order to collect the money, each bank sends two men (generally very young men) to the Clearing House.

A few minutes before eleven o'clock A.M. forty young men arrive at the long room, in which business is transacted. Twenty of these carry each a satchel, in which are nineteen bundles of checks, one for each bank. On the back of each bundle is indorsed the amount of its contents. As the messenger, or delivery clerk, carrying the satchel enters the room, he gives to the manager of the Clearing House a blank, on which is written the gross value of the checks which he carries.

At eleven o'clock precisely the manager taps a bell, and the young men arrange themselves in their allotted positions, on either side of the counter which runs up the center of the room. The messengers with the satchels of checks are ranged on one side, and a clerk representing each bank on the other. The arrangement is such that the messengers, passing along their side of the counter at intervals regulated by the ringing of the manager's bell, hand over the bundles of each bank as they come opposite its clerk, and receive in return a check for the amount. It is all accomplished in fifteen minutes; in that time twenty banks have delivered checks to nineteen other banks, and also taken in each case a receipt for the same. The messengers then have finished their part of the work, and disappear; the clerks then busy themselves with the amounts delivered to them, which they set down on a blank; the manager at the same time is working with the totals, and these two, the clerk's termination and the manager's, should agree, and generally do.

After their deliveries have been made the banks still do not deal with each other, but with the Clearing House. It will be observed that if, say, the First National puts in $1,000,000 in checks, and carries away only $500,000 of its own paper, there obviously is a balance due it of $500,000; or on the other hand, if it were to pay in $500,000, and carry off $800,000, then it would owe a balance of $300,000. Instead, therefore, of having a balance with each member, each bank has a balance with the Clearing House. Instead of there being about two hundred or more settlements to make, eight or ten banks pay the amount

they owe to the Clearing House, and it pays over the amount to ten or twelve banks. On the settling clerks getting back to their respective banks, and reporting to the cashier, if money is owed it is quickly got ready, in good money of the realm, and at noon conveyed in a satchel, or strong box, to the Clearing House. The usual balance is about $1,000,000. These amounts are left, a receipt being obtained from the manager. By half past twelve o'clock the last messenger has arrived, and paid in his balance. Most of the currency is in sealed packages of $5,000 or $10,000. The banks guarantee the correctness of the count, but errors are rare. Messengers then appear from the creditor banks, and receive their quota, and by one o'clock business is over.

At the New York Clearing House the same system is pursued. The hour of making exchanges is precisely half-past ten A. M.; between half-past twelve and half-past one P. M. the debtor banks pay to the manager the balances against them in actual coin of the United States, legal tender notes, or United States Treasury certificates of deposit. At half past one P. M., or as soon as the amount can be made up, and proved, the creditor banks receive from the manager the balance due to each of them, provided all the balances due from the debtor banks have been paid. Should any one of the associated banks fail, at the proper hour, to pay the balance against it, the amount would have to be immediately furnished at the Clearing House by the several banks exchanging with the defaulting bank, in proportion to their several balances against it, resulting from the exchanges of the day; and the manager is required to make such requisitions accordingly, to avoid delay in the general settlement. The amounts so furnished the Clearing House, on account of the defaulting bank, would, of course, constitute claims on the part of the responding banks against it, and it would cease to be a member of the association. Errors in the exchanges, and claims arising from the return of checks, or deficiencies in specie, or legal tenders, are adjusted directly through the banks that are parties to them, and not through the Clearing House, which is

in no way responsible for irregularities or mistakes of this kind. All checks, drafts, notes, or other items in the exchanges returned as "not good," or "missent," have to be returned the same day directly to the bank from which they have been received, and the latter must immediately refund to the bank, returning the same, the amount which it had received through the Clearing House for such items. Every bank belonging to the association is required to furnish a weekly statement of its condition to the manager for publication; showing the average amount of its loans and discounts; specie; legal tender notes; circulation, and deposits; and the aggregate of these returns form the bank statement every Saturday.

New members have to pay an admission fee according to their respective capitals, ranging from $1,000 for banks whose capital does not exceed $500,000, to $7,500 for banks whose capital exceeds $5,000,000. A standing committee of five is chosen at every annual meeting, which can, in cases of emergency, suspend any bank until the pleasure of the association is known. Any member can retire on payment of proportion of expenses. Expenses are borne *pro rata* after an annual payment of $200 each. The Clearing House only retains custody of the funds it thus holds for an hour or two, as trustee, and every bank connected with it keeps a current account with it, debiting it with all money sent, and crediting it with all returned.

THE BOARD OF TRADE.

The Chicago Board of Trade was inaugurated in 1848, and on February 8, 1849, it was organized under the state law. From small and apparently insignificant beginnings, it has come to be the great central force which controls the business of half a continent, and an important factor in the commerce of the whole civilized world. It supervises the inspection, warehousing, and shipping of grain, in well defined and standard grades, and the standards and inspection of flour, pork, beef, lard, butter, lumber, etc., have been perfected. The Board of Trade is also an essential agency

in the direction of state and national legislation on all commercial questions. The Hon. Thomas Dyer was the first president, in 1848. The erection of the present magnificent structure in which business is transacted was commenced in 1882, and the corner-stone was laid on December 13 of that year. The building has a frontage of 173¾ feet on Jackson street at the south end of La Salle street, and extends south 225 feet. The rear portion is occupied by offices, and is 160 feet high, and the front, containing the exchange hall, is 140 feet, surmounted by a tower 310 feet in height from the ground, the tallest in the city. The building is of Fox Island granite, and its cost was $1,730,000. The new temple of commerce, undoubtedly the most splendid and costly in the world, was formally dedicated April 26, 1886.

Some faint idea of the vast extent of the business transacted may be formed from the consideration of one or two items, important ones indeed, which enter into the daily transactions of the Board of Trade. In 1884 the receipts of wheat were 26,397,587 bushels, and the same year the crop of oats was 528,628,000 bushels. At the stock yards there is a daily killing capacity of 75,000 hogs; in 1885 there were packed 5,002,063 hogs. In the slaughtering business there is invested $12,000,000; the number of hands employed varies from 12,000 to 15,000; and the yearly wages amount to $3,500,000.

Most, if not all, the expressions used in transacting business are "Greek" to the public, and some explanation may prove interesting to readers.

A *bull* is one who operates to depress the value of stocks that he may buy for a rise.

A *bear* is one who sells stock for future delivery, which he does not own at the time of the sale.

A *corner* is when the Bears cannot buy or borrow the stock to deliver in fulfillment of their contracts.

Overloaded is when the Bulls cannot take and pay for the stock they have purchased.

Short is when a person or party sells stocks when they have none, and expect to buy or borrow in time to deliver.

Long is when a party or person has a plentiful supply of stocks.

A *pool* or *ring* is a combination formed to control the price of stocks.

A *broker* is said to *carry* stocks for his customer when he has bought, and is holding it, for his account.

A *wash* is a pretended sale by special agreement between buyer and seller, for the purpose of getting a quotation reported.

A *put and call* is when a person gives so much per cent for the option of buying or selling so much stock on a certain fixed day, at a price fixed the day the option is given.

To enlarge a little: "*A privilege*" is a contract by which the maker of it engages to purchase from the holder in the one case, or to sell to the holder in the other case, a number of shares of some specified stock, at a certain price, at any time within a certain period, at the option of the holder.

"*A call*" is a privilege bought of the maker at a certain price, and the owner of it is privileged to call for a certain amount of stock at a given price within thirty, sixty or ninety days, or four to six months. If a man holds a *put* he has a right to deliver to the maker of the privilege a stock at a certain agreed price within a certain number of days. For instance, suppose Western Union is selling at 70. A man wants a sixty-day *put* on it at 66, because he believes the stock is going down. He gives 1 per cent on the amount of stock he wants to deal in. A hundred shares is usual, and 1 per cent is $100. He receives in return a slip of paper signed. Then if Western Union goes below 66, within sixty days, he may buy it for whatever it is selling for below that price, and "put" it to the maker of the privilege at the price agreed on—66—and receive a check for $6,600; the holder makes the difference. If Western Union

does not go below 66 the holder of the written slip or "put" is out his $100.

The *Call* business operates in exactly the other way. You buy the privilege of calling Western Union at 75 when it is selling at 70. If it sells above 75 you can call on the maker of the privilege for a hundred shares at 75, and the hundred shares are thus bought by the holder for $7,500, and he turns around and sells it at 80, if the stock is selling at that price, and pockets the difference.

A *straddle* is a *put* and *call* combined. The holder of one may "put" stock to the maker of the privilege, or "call" for it. That class of privilege comes high, because there is money in it whichever way the market goes. If the market does not go at all, but stands still, the maker is *in* the money he has paid for the privilege, usually about 3 per cent.

A *spread* is also a *put* and a *call* combined, but there is this difference: A "straddle" is made at the market—that is to say, the maker of the privilege takes the risk that the stock in question does not move to any extent from the price at which it is selling when the privilege is sold. In a "spread" the maker has more leeway. If Western Union is selling at 70, the maker of the privilege sells a "spread" say at 67 and 80. If it goes below 67, the holder of the privilege can put the stock to the maker, and corral the difference, and if it goes above 80 the holder of the privilege can call the stock from the maker at that price and reap the profits. But so long as the price of the stock keeps within those points the maker of the privilege is safe. To put it in another way: the holder of a *straddle* will make if the market for the stock he is dealing in moves at all; whereas, the holder of a *spread* doesn't make anything until the market moves past certain limits. Privileges are now sold in cotton-seed oil certificates, petroleum certificates, wheat, cotton, eggs, butter and coffee, as well as stocks, and several years ago, when the crop of fire-works for Fourth of July looked a little bit in doubt, owing to troubles between foreign and domestic

manufacturers, privileges on rockets and cargoes of fire-crackers and pin-wheels were hawked about Maiden Lane, New York, the headquarters for pyrotechnic dealers. At the close of 1885 the membership of the Chicago Board of Trade was 1,925. A Clearing House worked on the same principles as that of the banks was established in 1883, and is in successful operation.

CHAPTER XVII.

POPULAR CHEMISTRY.

THE material world immediately under our observation, including such parts of the earth's crust as have been explored, the plants and animals upon its surface, and the atmosphere which envelops it, is found to consist of 62 simple substances, just as all the words which compose a language are resolvable into a few letters. These substances, having hitherto resisted all endeavors to divide or resolve them into any others, are termed the *elements of matter*, or *simple bodies*. But all that is meant here is that *at present* there are upwards of 60 substances defying analysis, not that that number may not ultimately be reduced. The investigation of the laws under which these various elementary bodies have formed the numerous compound substances which we meet with in nature, and the means by which compound substances can be resolved into their simple elements, or simple elements thrown into new combinations, are the objects of the science of chemistry. There is no science so immediately conducive to human comfort. To whatever art or manufacture we turn our attention we find that it has either been created by chemistry, or owes to it some of its greatest improvements.

CHEMICAL ATTRACTION.

When particles of different kinds of matter are brought into contact, they frequently unite and form new substances, differing widely in many instances from those by whose union they have been formed. This is called *chemical attraction*, or chemical affinity, because it is said that the particles of certain bodies, hav-

ing an affinity for each other, will unite, while others having no affinity do not enter into union. If a piece of marble be thrown into vitriol or sulphuric acid their particles will unite with great rapidity and commotion, and there will result a compound differing in all respects from the marble or the acid. This is as at once an instance of affinity between two substances and an exhibition of stronger and weaker affinity. The commotion or effervescence in the experiment arises from the disengagement of a gaseous acid (carbonic) in combination with the basis of the marble, in consequence of the sulphuric acid having a stronger affinity for it. When a piece of caustic magnesia is thrown into vitriol we have a case of simple affinity, with a complete change also of properties. All their elements combine, without any disengagement, and the result is the production of Epsom salts, a compound with properties entirely new. Neither ingredient has been destroyed; they can again be extracted pure from the compound; but they have changed their characters through the force of affinity. But if a piece of quartz or gold be thrown into the acid, no change is produced in either, because the particles of the respective substances have no affinity for each other.

This process of affinity is termed in chemical language *combination*, and is quite distinct from *aggregation*, which is the union of particles of a similar kind, forming a mass which has the general properties of the particles of which it is composed, whatever may be its structure or form. It is also to be distinguished from *mechanical mixture*, in which the particles, although they may be intimately blended, are not amalgamated with each other so as to lose their individual properties. The difference between chemical combination and mechanical mixture will be clearly seen from the following example: If into a crystal bottle we pour a portion of oil and a quantity of water, and shake them well, the two substances can never be made to unite permanently, although they appear to do so for a short while after the experiment is made; yet if the vessel be allowed to stand for a sufficient length of time, the particles of water,

being heavier than those of the oil will descend to the bottom, while those of the oil will rise to the top. There has been a mechanical mixture without any chemical combination. But if with the water we add some potash, the particles of the three bodies will immediately unite with each other, and a compound will be formed having properties entirely different from either the oil or the potash. The compound substance thus obtained is soap.

It sometimes happens that two bodies will readily combine with each other, but if a third body be added, the combination will be destroyed. Thus, if magnesia be dissolved in nitric acid, a complete union takes place; but if lime be added to the compound, the nitric acid unites with the lime in preference, and the magnesia, which was formerly dissolved, falls or is *precipitated* to the bottom of the vessel. Again, if a piece of aqueous sulphate of copper (common blue vitriol) be suspended by a thread in a glassful of water, the crystals shortly disappear and the whole fluid becomes tinged with blue. Here the solid is said to be *dissolved*—that is the cohesion of the particles is destroyed, and the compound is called a *solution* of the solid. Such a solution differs entirely from a chemical union, and is merely a very perfect mechanical mixture—the same as if we dissolved sugar or salt in water. The restoration of cohesion to a body after it has been deprived of it, is exhibited in a great variety of instances. For example, if a quantity of sugar be dissolved in water and the solution be allowed to stand till the water has evaporated, the attraction of cohesion will take place between the particles of sugar, which will again resume the solid form. Here, however, a remarkable circumstance occurs; whatever the state of the sugar may have been originally, it invariably, in resuming its solidity, assumes a particular form, one of great regularity and beauty. It was formerly opaque; it is now transparent; originally a shapeless mass, it is now a prism of six sides, surpassing in luster and symmetry the products of the lapidary's wheel. This solid spontaneous produc-

tion is called a crystal; the process by which it is produced, *crystallization;* and the science, the object of which is to study the forms of crystals, *crystallography.*

Bodies, whether solid, liquid, or gaseous, are susceptible of assuming the *crystalline* form, and the substances which do so are numberless. Instances of crystallization, such as sea salt, epsom salts, saltpeter, are familiar to every one. Water, it is well known, when cooled to a certain degree, assumes the form of ice, which is crystalline. There are three methods of producing artificial crystals: first, by dissolving the substance in a hot liquid, and either allowing the solution to cool, or evaporating it by continued heat; second, by making the substance assume the aërial form; and third, by melting it by fire without the presence of a liquid, and allowing it to cool slowly. The presence of the atmosphere has a considerable influence on the formation of crystals.

LAWS OF COMBINATION AND DECOMPOSITION.

Not only the active properties of bodies are changed by combination in chemical attraction, but their density, temperature, form, color, taste, smell, and sonorousness are generally affected. Chemical attraction can take place between two, three, or even a greater number of bodies. The force of chemical affinity between the constituents of a body is estimated by that which is requisite for their separation. It has been already remarked that the degree of attraction varies very considerably in different bodies; and it is evident that from this variation all chemical compositions and decompositions take place. The preference for uniting with another substance which any given body is found to exercise, is metaphorically termed *elective attraction* or *affinity.* It is of two kinds, each of which derives its name from the number and the powers of the principles which may be brought into contact with each other.

When a simple substance is presented to a compound one, and unites with one of the constituents of the latter, so as to

separate it from that with which it has been combined, and by this means produce a decomposition, it is said to be effected by *single elective* affinity. Some substances, however, will not be thus easily decomposed; and it is found necessary to introduce two or more principles in order to effect the end in view. When two principles, therefore, are presented to a compound body, and when the principles unite each with one of those of the compound substance, two new substances are formed; and all instances of decomposition in this manner are said to be effected by *double elective affinity*. It is to be observed that all changes effected in this manner are permanent, and that the new compound thus formed cannot be decomposed, until a substance having a more powerful attraction for one of its constituents than they have for each other, is brought into contact with them.

ORGANIC CHEMISTRY.

Vitality enables plants and animals to absorb and assimilate food, consisting of the elements necessary for their increase, and also to reproduce beings of their own kind by means of certain organs; hence they are said to be organized, and the substances of which they are composed are known by the general name of *organic matter*. Earths, minerals, metals and the like, not possessing vitality have no organs and consist of *inorganic* matter. Organic chemistry is, therefore, that department of science which treats of the composition, properties and uses, as well as of the origin of all substances produced in the animal and vegetable kingdoms and of the artificial compounds arising from their decomposition. The chemist finds, however, so far as the ultimate analysis of organic substances can show, that plants and animals are composed of the same elements as inorganic matter; and that the two branches of the science are not essential, so far as the nature of these elements is concerned. There is this peculiarity, however, that a certain class of organic compounds possess the property of uniting with the elements, and of forming with them new combina-

tions, which are analogous in their properties to the combinations of two simple bodies.

Until the early part of the present century organic chemistry was defined as the study of those bodies derived from the working of animal or vegetable life, together with their numerous compounds and derivatives It was assumed that for the conversion of mineral substances into organic bodies there was requisite a peculiar force only existing in living organisms, and essentially different from that which regulated the apparently simpler laws of mineral chemistry. The enormous development of organic chemistry has, however, gradually obliterated this line of distinction between organic and mineral bodies. The number of organic bodies built up from their elements, or from their simplest mineral combinations, is on the increase, and the results in the region of artificial synthesis approximate nearer and nearer to the highest stages of chemical complication — the immediate agents of organic life — the cellular constituents of plants and animal life.

The laws which govern organic synthesis have shown themselves to be in no way different from those concerned in the changes and combinations of mineral substances. The best arbitrary definition of organic chemistry is one depending on the fact that all organic bodies contain *carbon* as the essential constituent, for it is to the chemical characteristics of carbon alone that the compounds termed organic, compared with mineral compounds, owe their peculiar character. Naturally occurring organic bodies contain but a limited number of elements in combination with carbon, many only hydrogen and oxygen ; many more contain both hydrogen and oxygen, and others again these in addition to nitrogen, sulphur and metals.

VEGETABLE COMPOUNDS.

Notwithstanding the infinite diversity of form which vegetable substances assume, it has been proved that they are all mainly composed of the same elements, and these are only *four* in number : oxygen, hydrogen, carbon and nitrogen. These,

again, by uniting themselves, form many of the compounds which constitute the vegetable structure; and these compounds being the more immediate objects of sense in the investigation of any organization, are called their *proximate principles.* Existing ready formed in roots, wood, barks, leaves, fruit, and seeds, we find a considerable number of proximate principles, in the form of acids, alkalies, sweet principles, bitter principles, oils, exudations; some poisonous, others wholesome; some spontaneously separating, others remaining obstinately combined.

Common *citric acid* exists in the juice of lemons, and when crystallized, 100 grains consist of: water $23\frac{2}{3}$, and pure acid $76\frac{1}{3}$, which is a compound of 42.1 oxygen, $31\frac{5}{8}$ carbon, and 2.63 hydrogen. *Malic acid* is the sour principle of apples and other fruits. It consists of the same ingredients as the former. *Tartaric acid* is the sour principle of grapes; a large quantity of which being left to ferment produces wine. On the side of the vessel containing this liquor, crystals of the acid, combined with potash, are formed, and these, when purified, form *cream of tartar.* Twelve parts in the 100 are water; and the remaining 88 consist of oxygen 52.87, carbon 32.39, and hydrogen 2.64 parts. *Oxalic acid.*—The plant called sorrel is valued for its acidulous taste, which is due to the presence of this acid. It has no hydrogen in its composition, consisting merely of oxygen and carbon. It is an active poison, and from resembling Epsom salts in appearance, many persons have fallen victims to its virulence. The antidote is powdered chalk. *Gallic acid* is obtained from nut-galls. Its most remarkable property is that of changing the color of solutions containing iron to an intense blue-black color, as in the case of common writing ink. One hundred grains consist of 56.25 carbon, 37.5 oxygen and 6.25 hydrogen.

Prussic, or *hydrocyanic acid,* found in various fruits and flowers, is a most virulent poison; it is formed of hydrogen and cyanogen, a noxious inflammable gas. Such acids as these just

described exist ready formed in fruits, etc.; they are simple *educts.* There are others formed by chemical changes produced by certain elements contained in vegetables, which afford the base of the acid ; these are acid *products ;* some are produced by the agency of heat, others by the action of nitric acid. *Acetic acid,* or vinegar, is one of these, being a product of any liquid capable of undergoing the vinous fermentation. Fermentation produces alcohol, and alcohol, by oxidation, is converted into acetic acid. Several acids, when distilled at a high temperature, undergo decomposition, and new acids are formed ; their names remain the same, or have the word *pyro* (from the Greek *pyr,* fire) prefixed, as *pyro-citric acid.*

It has also been ascertained that *alkalies,* as well as acids, exist ready formed in plants as one of their constituent principles. Alkalies may be defined as bodies which combine with acids, so as to impair or neutralize their activity, and produce what are called salts. They are distinguished by properties the reverse of acids, and the two classes are generally looked upon as antagonistic substances. Plants which evince alkaline properties of a weak character are called *alkaloids.* The alkalies are *quina* and *cinchona,* which resemble each other, and have a bitter taste ; *morphia,* which is obtained from opium, and is a white crystalline powder ; *strychnia,* one of the most powerful bitters and poisons, which is much used in medicine and as a poison ; *brucia,* also a violent poison ; *digitalia* which is procured from the leaves of the foxglove ; hyoscyamia, atropia, veratria, emetina, etc., which are derived from henbane, deadly nightshade, etc.

Of the other proximate principles, the first deserving of notice is the woody fiber which constitutes the solid basis of all vegetable structures. It is called *lignin* (from *lignum,* wood); and consists of 52 carbon, and 48 of oxygen and hydrogen in the ratio which forms water. With lignin are associated various other bodies, such as *resins,* which are various and abundant. In the different species of pine we discover that peculiar liquid

resin called *turpentine.* From resins are obtained what are called *essential oils;* because after the resin has been heated in a distilling apparatus, an odoriferous oil distils over and leaves the resin hard, dark, and odorless. The *essence* of the substance is supposed to have passed away in the aëriform state — hence the name. From its speedily evaporating on being exposed to air it is called *volatile oil.* The seeds of plants yield another oil, which, not evaporating, is called *fixed oil.* *Gum,* for instance gum-arabic, has the following properties: it is transparent, tasteless, perfectly soluble in water, viscid in solution, capable of cementing fragments, and of affording a varnish; and totally insoluble in spirit of wine. There is a class of bodies called *gum-resins,* whose properties are intermediate between those of gum and resin, and somewhat allied to resins, although essentially different in most of their properties; these are *caoutchouc* and *gutta-percha.* They are the exuded juices of peculiar trees, and are composed of carbon and hydrogen.

From wheaten flour a substance is obtained called *gluten,* from its glutinous nature. A substance named *vegetable albumen* seems to be the basis of all emulsive grains in place of starch, and greatly resembles it. *Starch* is a fine white sediment, capable of being extracted from the white and brittle parts of vegetables, particularly the tuberous roots, and the seeds of the gramineous plants. One of the most remarkable properties of starch, or, as it is called, *fecula,* is that of being convertible into sugar by the action of diluted sulphuric acid. *Sugar* is derived from many sources — from sugar cane, maple tree, beet-root, grapes. Nothing is easier than its formation from grapes: grape juice is to be saturated with chalk, clarified with the white of eggs, or blood, and evaporated; after a few days it assumes the form of a crystalline mass. *Tannin.*—From the oak-bark, or nut-galls, a peculiar substance is obtained, called tannin,— so named from being the material employed in tanning leather. It is inodorous, colorless, and possesses a rough, astringent, bitter taste.

ANIMAL COMPOUNDS.

The chief substances which enter into the composition of animal matter are, oxygen, hydrogen, nitrogen, carbon, phosphorus, and lime. We also find certain acids and metals, but in quantity so minute as not to affect the general truth of the statement. Bone consists chiefly of phosphate and carbonate of lime and *gelatine.* The last is the coagulating, or rather elastic, principle in all *animal jellies.* When bones are burned in a close vessel they form *ivory black. Fibrin* is obtained from the animal tissue, and when recently obtained is elastic; when perfectly dry, it is somewhat horny and transparent. The *tendons, ligaments,* and *membranes* are nearly allied to gelatine in their nature. *Fatty* substances, as lard and oils, are formed chiefly of carbon, with a little hydrogen and oxygen — one or both. *Albumen* is a substance very abundant in animal matter. It occurs nearly pure in the white of eggs. Of this substance in the coagulated state, along with gelatine, are *horns, nails* and *hoofs.*

Of the fluids of the animal body, *blood,* one of the most important, is viscid, of a red color, exhaling a vapor of a peculiar odor. When left at rest a few hours, its appearance is very much altered, having separated into two parts — one quite liquid, of a whey-like color, and called *serum;* the other an elastic, firm jelly, of a crimson-red color and a thick consistency, resembling a deposit, which is called the *clot.* If this clot be repeatedly washed with cold water, it parts with its red color to the water, becomes white, and a fibrous matter remains, which, when subjected to analysis, proves to be *fibrin.* Serum coagulates when heated to about 160°, nearly in the same manner as the white of an egg, but the color is not pure white. If the serum thus coagulated be cut in slices, a fluid will exude, which is called the *serosity* of the blood; it consists chiefly of water, holding a little altered albumen, and a little common salt, in solution. Serum is composed of water, albumen, soda, and some salts of soda. Clot is composed of fibrin, albumen, red coloring matter, a little

iron and carbonic acid. During the conversion of arterial blood into venous blood, nitrogen, hydrogen, and other elements are spent in the formation of new products, while the proximate principles of the blood remain with an increased proportion of carbon. In this state it is exposed to the atmospheric air in the lungs, the oxygen of which abstracts its excess of carbon, and forms the carbonic acid breathed out; and this process constitutes the conversion of arterial into venous blood.

CHAPTER XVIII.

POPULAR CHEMISTRY.

(*Continued.*)

CHEMISTRY APPLIED TO THE ARTS.

CHEMISTRY is now indispensable to the proper conducting of almost every useful art. Agriculture, which may be considered the most important of all the arts, is radically dependent on chemistry; for without a knowledge of that science the husbandman remains ignorant of the constitution of his soil and crops, the action of the atmosphere and the sun's light, and the properties of those materials which are required to enrich his exhausted fields. Baking. brewing, distilling, and indeed all the operations by which food is prepared from the condition in which it is furnished by nature, are in general a series of chemical processes. So likewise is the manufacture of pottery-ware, porcelain, glass, paper, etc.; the operations of bleaching, dyeing and calico-printing; the preparation of soap, gunpowder, ink, salt, drugs, paints, perfumery. The applications of chemistry to the arts extend to the whole circle of manufacturing industry. *Chemical manufactures,* in contradistinction to *mechanical* are those which involve an elementary change in substances, as in the manufacture of sand, potash and lime into glass; of common salt into soda; iron ore into metallic iron; hides into leather; and charcoal, sulphur and saltpeter into gunpowder, are chiefly chemical processes; while the conversion of flax into cloth, and clay into pottery, are principally mechanical, though in both there is a necessary blending of chemical with mechanical appliances

Acetic acid, or the sour principle in vinegar, is obtained either by the slow combustion of a liquid containing alcohol, as in the case of malt vinegar or wine-vinegar, or by the destructive distillation of wood.

ALCOHOL.

The spirituous or intoxicating principle in fermented liquors, is called by the chemist alcohol. The variety best known in this country is that derived from grain, in the preparation of which four distinct processes are successively followed, namely: *mashing,* which simply means extraction of the sugar by means of heat and water; *cooling,* which has to be done as rapidly as possible; *fermentation*; which consists of putting in yeast or any other ferment by which the sugar is again changed into carbonic acid and alcohol. When this takes place it is ready for the last process: *distillation,* by which it is purified and made marketable. The following is the percentage of

ALCOHOL IN VARIOUS LIQUORS.

Scotch Whiskey	54.53	Currant Wine	20.50
Irish Whiskey	53.9	Port	22.90
Rum	53.68	Madeira	22.27
Gin	51.6	Teneriffe	19.79
Brandy	53.39	Sherry	19.17
Burgundy	14.57	Claret	15.1
Cape Muscat	18.25	Elder	8.79
Champagne [still]	13.80	Ale	6.87
Champagne [sparkling]	12.61	Porter	4.2
Cider	5.2 to 9.8	Malaga	17.26
Constantia	19.75	Rhenish	12.8
Gooseberry Wine	11.48	Small Beer	1.28

BLEACHING.

Bleaching is the art by which various articles may be deprived of the colors which they naturally possess, and so rendered white. This used to be done by the action of the atmosphere and sun's light, now it is done by bleaching powder.

Calico-printing consists in impressing the representation of

certain figures or designs upon cloth; these are done now mostly by chemical combinations.

Colors. There are, as is well known, two modes of imparting colors, dyeing and painting; the former term being applied to articles colored by a liquid infusion, the latter to the laying of a coloring substance on the substance to be dyed. We dye cloth and paint a house.

Dyeing. A remarkable circumstance connected with dyeing is the different degrees of facility with which animal and vegetable substances imbibe the coloring matter applied to them. Tissues of silk and wool receive more brilliant colors than those of cotton and linen, the reason why has never been discovered.

Ether is very closely connected with alcohol. Both contain a compound substance called ethyle. It is a colorless and transparent liquid, very inflammable, and of the very highest importance to the photographer as it furnishes him with a liquid which, in conjunction with alcohol, affords a ready means of dissolving gun-cotton and yielding collodion, so remarkable for the rapidity and accuracy with which it admits of sun portraits being taken. It is often used as an anæsthetic agent.

GUNPOWDER AND GUN-COTTON.

The Chinese seem to have employed a coarse variety for fireworks at least 200 years B.C. From there it found its way to the Arabs, and they in turn communicated the discovery to the Greeks. It is possible that it may have formed the principal ingredient in the *Greek fire.* The substances employed in its manufacture are niter, charcoal and sulphur.

Gun-cotton, like gunpowder, contains everything within itself requisite to its complete combustion; indeed in the elementary composition of both there is little or no difference. The advantages which it possesses over gunpowder are lightness of weight. It leaves no residue; when it becomes wet or moist it can be dried again; no smoke results from its combustion.

LEATHER-MAKING

is the art by which the skins of animals are rendered impervious

to the action of those external agents which would otherwise decompose them. The most common way of effecting this is brought about by steeping the skins in tannin or tannic acid, when a chemical combination of the skin and tannin ensues, which is leather. Tannin is obtained from bark of trees and also from the gall-nuts of the Levant oak. Very heavy leather takes from twelve to eighteen months before it is ready for use, but the lighter makes only take from five to eight months.

SOAP.

This exceedingly useful article, of which the ancients were entirely ignorant, is a compound of certain ingredients in oils, fats or resin, with a salifiable base. Common hard white soap is made from soda and tallow, for finer makes, 50 per cent or more of lard is added, which gives the soap a fine, "smooth skin." Cocoanut oil is also added occasionally to the extent of ten per cent. Yellow or resin soap is similarly prepared from tallow, resin and soda. Mottled or marled soap is resin soap which has not been permitted to deposit all its impurities. Toilet soaps are a fine preparation of white soap with oil and perfumes. Castile soap is prepared from olive oil and alkaline lye.

FICTILE MANUFACTURES.

We employ the term fictile to comprehend all those arts which, like that of the potter, involve the molding or fashioning of crude materials into determinate forms. Thus with some degree of latitude, earthenware, porcelain, glass, bricks, tiles, mosaic tesseræ, cements, artificial gems and the like, may be designated *fictile fabrics*, in contradistinction to those of woolen, silk, cotton and other vegetable and animal fiber, which are strictly textile. The subjects thus embraced are numerous and important; of scientific importance, as involving at every step the deductions of chemistry and the principles of taste; and economically so, as elaborating from the crude and apparently worthless materials of the soil an almost infinite variety of

articles of utility and elegance. Our limited space precludes the idea of a minute account, and restricts us merely to the leading features of the manufactures in question.

THE MANUFACTURE OF EARTHENWARE.

Earthenware.—That is, mere sun-dried or fire-dried vessels of clay—seems to have been one of the earliest of human arts; but pottery with a painted glaze was unknown till about the ninth century, when it was first attempted by the Arabs in Spain. Vast improvements have taken place in this art since the middle of last century through the advance of chemical and mechanical knowledge and appliances.

Stoneware is intermediate between earthenware and porcelain and may be described as a coarse kind of porcelain, made from sandy clay, containing oxide of iron and a little lime, to which it owes its fusibility. The glazing is performed by throwing common salt into the heated surface, this is volatilized, and decomposed by the joint action of the silica of the ware, and of the vapor of water always present; hydro-chloric acid and soda are produced, the latter forming a silicate which fuses over the surface of the ware and gives a thin but excellent glaze.

PORCELAIN OR CHINA.

This is a fine grained, compact, very hard, faintly translucent ware, of which there are two kinds—one called hard, and the other tender or soft. *Hard* porcelain is composed of a clay containing silica, which is infusible, and preserves its whiteness in a strong heat, and of a flux containing silica and lime. The glaze of this ware is earthy, and admits of no metallic substance or alkali. *Tender,* or soft porcelain consists of kaolin, Cornish stone and bones. It is glazed with artificial glass, into the composition of which silica, alkalies and lead enter. Kaolin-clay is the largest ingredient in porcelain ware. It is composed of alumina and silica. In painting on porcelain, the same coloring materials are used as those employed in coloring glass or earthenware. In all the more delicate patterns they are laid on with a

camel-hair brush, and generally, previously mixed with a little oil of turpentine. This art of painting on porcelain, or *in enamel* is of the most delicate description; much experience and skill are required in it, and with every care there are frequent failures; hence it is attended with considerable expense. The gilding of porcelain is generally performed by applying finely divided gold mixed with gum water and borax; on the application of heat the gum burns off, and the borax, vitrifying on the surface, causes the gold to adhere; it is afterwards burnished with bloodstone, agate, or other polishers. Porcelain vessels are very brittle, and are easily damaged, which accounts in some degree for the high price at which they are sold. It is calculated that, after being manufactured, one-third of the articles are found damaged, mostly in the kiln. The wares of Sevrès, Tournay, Dresden, Berlin and Florence are famous.

BRICKS, TILES, DRAIN-TUBES.

These formed of tempered clay and artificially hardened by heat, may be termed a kind of artificial stone. *Bricks* have been used for building purposes from a very early period in the world's history, but the quantity manufactured and used in this country at the present day exceeds anything in the past, however great. *Tiles* are prepared much in the same way as bricks, only from their being thinner and of a more intricate form they require to be made of a finer and tougher material. Drain tiles and tubes are always made by machinery. For architectural decorations, figures, vases, etc., on a large scale, a variety of argillaceous compounds are in use, the principal of which is known as *terra cotta*—literally, baked clay. This composition consists of pipe or potter's clay, a fine colorless sand, and pulverized potsherds. These are worked into a homogeneous paste, which is modelled or cast into the figure required, then slowly dried in the air, and finally fired to a strong hardness in a proper kiln. Tobacco pipes are made of a finely ground white plastic clay.

ENCAUSTIC TILES, TESSERÆ, MOSAICS.

The term *mosaic* is from the Greek *mousaikon*, elegant, or polished; and is now applied to the art of imbedding or inlaying in a cement fragments of different substances so as to produce the effect of a picture. This art was practiced at a very early period and was introduced into Italy by the Byzantine Greeks. Magnificent specimens are to be seen at St. Peter's at Rome, and in the chapel of St. Lawrence at Florence, where precious marbles, agates, jaspers, malachites, etc., constitute the colored tesseræ.

The ancients applied mosaics chiefly to pavements, for which they are admirably adapted. Specimens of highly decorated pavements are also frequently met with in the grand ecclesiastical structures of the middle ages. Such is the beauty and durability of this species of pavement that the art has been revived. Great care is taken in the preparation of the clay, it being repeatedly washed and purified and passed through fine sieves. The pattern is first carefully modelled in clay, the parts constituting the device being depressed about a quarter of an inch, and from this a cast is taken in plaster, and placed in a metal frame; when the pattern is of different colors, the clays of different color are poured into the indented parts of the pattern, covering the whole surface of the tile and are allowed to dry. The surface is then scraped, so as to expose the pattern, and the tile is placed in the drying house for two or three weeks and finally subjected to intense heat for sixty hours, which brings out the colors with great brilliancy.

GLASS.

The first glass manufactory of any note was established at the village of Murano, near Venice. The Venetians were long celebrated for making mirrors. Window-glass appears to have been made in England in the middle of the fifteenth century. The first plate-glass for mirrors, coach-windows, and the like was fabricated at Lambeth, London, in 1673 by a Vene-

tian workman brought over to England by the Duke of Buckingham. Crown or window-glass is usually composed of alkalies and fine white sand ; the best sand for glass-making is that which contains most transparent particles. This is the base of glass, but to the alkali and silica (sand) lime and other ingredients are applied. Alumina, which is also sometimes added and always accidentally present, renders the glass liable to devitrification. Iron, also, is present, and as this colors the glass, its effects are got rid of by the addition of manganese. Arsenic, soda, charcoal and chalk are also employed. All the pigments used in painting on or staining glass are oxides of metals or minerals, as gold, silver, cobalt, manganese, etc. The description of glass best adapted for painting upon or staining, is the finest crown or window-glass.

TEXTILE MANUFACTURES.

By *textile manufactures* as generally defined, are meant those on which filaments of flax, of cotton, of silk or of wool, are wrought into linen, cambric, calico, muslin, silk, satin, flannel, etc., etc. In the preparation of these, from the rearing of the raw materials to their ultimate stage as articles of utility and luxury, there is involved a vast amount of labor, of mechanical and chemical skill, of capital and enterprise,—so much so, that as a class they rank second to none of the manufactures which come within the scope of our national industry.

Linen is the most ancient of the textile manufactures. In the oldest records, sacred and profane, mention is made of it. The word is derived from the old name of the plant now called *flax*, which is preserved in *lin* seed. Linen is cloth made of *lint*, which is the fibrous bark of the flax plant. The continent of Europe, and especially the Baltic countries, are the chief producers of the plant.

Hemp is the fibrous bark of the *Cannabis sativa*—a plant supposed to be native to Persia or India, but which has long been naturalized in Europe, particularly in Italy, Russia, and

Poland, and is cultivated to a considerable extent in this country. Its fibres are made into yarn for the fabrication of canvas-bagging, sail-cloth, ropes and cordage.

Cotton.— The cotton plant is of the order *Malvaceo,* its type being the common mallow. The genus *Gossypium* is that which produces cotton, comprising according to various authorities from five to ten species, all natives of intertropical climates and indigenous to America and India. The most useful species and the one generally cultivated is the *Gossypium herbaceum,* a herbaceous cotton-plant. It is an annual, the average height being twenty inches. As the plants do not ripen uniformly the operation of picking has to be repeatedly gone through, warm, fine weather being always chosen, never damp. The qualities used for manufacturing purposes are various. Its value is reckoned by the length, strength and fineness of the staple or fibers. The "long stapled," or valuable cottons, are Sea Island, Brazilian, West India, Egyptian; the "short stapled," or inferior qualities, are the Upland cotton of America, the Orleans, Mobile, and Surat. England long held supremacy in the manufacture of cotton, but in recent years this country has made immense strides in this as in all the other textile manufactures.

Silk, that beautiful and unrivaled material, is the produce of a plain-looking, greedy, leaf-devouring larva,—the caterpillar of the silk-moth. It is thus directly of animal, although indirectly of vegetable, origin. The silk-worm is supposed to have been indigenous to China. At an early period a considerable commerce was established in silk between eastern and western Asia, from which latter quarter it was conveyed to Europe. The first silk-worms seen in Europe were brought from China in the year 552, by two Persian monks who had gone thither as Christian missionaries, and who contrived to secrete a number of the eggs in a cone, and to escape with them to Constantinople. From these few eggs have sprung all the successive generations of the insect which have supplied silk to Europe from that period to the present time. Silk is woven into various fabrics. The fine, soft

pile of *velvet* is produced during weaving by inserting short pieces of thread doubled, under the shoot or web. It has been estimated that a million and a half of human beings derive their sole support from the culture and manufacture of silk, and that it creates an annual circulating medium of between $150,000,000 and $200,000,000.

Wool "is a peculiar modification of hair, characterized by fine transverse or oblique lines from 2,000 to 4,000 in the extent of an inch, indicative of a minutely imbricated scaly surface when viewed under the microscope, in which and on its curved or twisted form depends its remarkable felting property and its consequent value in manufactures." Wool, although principally derived from the sheep in its many varieties, is obtainable also from the goat and other animals. The Thibet goat furnishes the finest of all wool, and the merino sheep the next best. Wool as used in our manufactures is divided into two sorts: the long, or combing, and the short, or carding wool. These again give rise to the two grand divisions of the trade: the cloth, or the short wool, and the worsted, or long wool departments.

CHAPTER XIX.

NATURE AND SCIENCE.

IT IS by our senses that we obtain a knowledge of the external world. Some philosophers have held that there are innate or inborn ideas in the mind; but, setting aside all philosophical discussion as out of place here, one thing is certain that it is through the faculties of hearing, seeing, tasting, touching and so on, that we obtain a knowledge of what we cannot help believing is all around us. Those feelings which we have we call *sensations*, and the cause of them we call *things* or *objects*. These sensations being appropriated by the mind, or perceived, the reasoning faculty is awakened through the perception of the difference of things, and by and by a certain rough and ready classification is made. Even the rudest savage knows things as rough or smooth; light or heavy; black or white; and so on. This is the beginning of science. But the mind by its very constitution and nature, continues to work. It goes on distinguishing and classifying, never resting satisfied in any direction until a matter is finally settled, and a thing finally placed. Thus a distinction comes to be made in regard to the qualities of objects which are designated sometimes *properties* and sometimes *powers*.

PROPERTIES AND POWERS.

The odor of camphor is one of its properties. Lead is said to have the property of heaviness. On the other hand steam, we say, has the power to make the engine move along; or the venomous snake has by its bite the power to kill a man.

ARTIFICIAL AND NATURAL OBJECTS.

Things shaped or made by the art of man are termed *artificial,* whilst objects which would be just what they are if man did not exist are called *natural,* and to the whole of them we give the name Nature. Although this distinction is very easily made and very convenient, yet in the sense of *creating,* it is necessary to remember that man can make nothing whatever except out of what existed before in some shape or form. He cannot create. The practice of every art implies a certain knowledge of natural causes and effects; and the improvement of the arts depends upon our learning more and more of the properties and powers of things, and discovering how to turn these, and the connections of cause and effect among them, to our own advantage.

Many objects and chains of causes and effects in nature are out of our reach. The motions of the heavenly bodies are among these, as are hurricanes, earthquakes, storms, volcanic eruptions and the like. We can neither prevent nor direct these. So long as man is ignorant he is the mere sport of nature. To begin with, he is servant and nature is master. Science reverses this, and the electric fluid which he thought was the instrument of the gods to work his destruction, becomes his messenger.

THE ORDER OF NATURE.

Nothing happens by accident, and there is no such thing as chance. The order of nature—such as the rising of the sun in the east and setting in the west; that water always runs down hill; that fire burns; that the seasons follow each other—so far as such order prevails it is often felt that things are explained; whilst all the rest are many times attributed to chance or happen by accident, which is another way of saying we are ignorant and are unable to unravel the wonders of nature.

LAWS OF NATURE—LAWS ARE NOT CAUSES.

Everything that we know about the powers and properties of natural objects and about the order of nature, may properly

be termed the law of nature. But it is desirable to remember that the laws of nature are not the causes of the order of nature, but only our way of stating what we have deducted from that order. To speak of the violation or the suspension of a law of nature is an absurdity. All that the phrase can really mean is that we have made a mistake in stating that order. A true natural law is a universal rule, and as such admits of no exceptions. Knowledge of nature is the guide of practical conduct. If nothing happens by chance, but everything in nature follows a definite order, and if the laws of nature embody that which we have been able to learn about the order of nature, then it becomes very important for us to know as many as we can of these laws of nature, in order that we may guide our conduct by them. Nobody can live for half a day without attending to some of the laws of nature; and thousands of us are dying daily or living miserably, because men have not yet been sufficiently zealous to learn the code of nature.

"Forewarned is forearmed," says the proverb; and knowledge of the laws of nature is forewarning of that which we may expect to happen when we have to deal with natural objects. Science is the knowledge of the laws of nature obtained by observation, experiment and reasoning. In strictness all accurate knowledge is SCIENCE; and all exact reasoning is scientific reasoning. The method of observation and experiment by which such great results are obtained in science, is identically the same as that which is employed by every one, every day of his life, only more full, precise and free from unconscious inference. So also with scientific reasoning, it strives to be accurate; and it is just as hard to reason accurately as it is to observe accurately. Thus science and common sense are not opposed, as people sometimes fancy them to be, but science is perfected common sense. The way to science then lies through common knowledge; we must extend that knowledge and learn how to reason accurately from these rules, and thus arrive at rational explanations of natural phenomena, which may suffice for our guidance in life.

FACTS ABOUT ASTRONOMY.

One is apt to imagine that the moment the sun arises on the horizon its light reaches our earth, but that is not so. Light requires time to travel as well as we do. The rate at which light travels is so exceedingly rapid, that in the comparatively small distance between any two objects on our planet no one would ever attempt to measure its pace. But the heavenly bodies are at such an immense distance from us that a measurement becomes possible. And thus astronomers can tell us accurately that the speed of light on its journey is 192,000 miles in a second! Now, for example, as the moon is 240,000 miles distant from us, it follows that, when its first narrow margin escapes from an eclipse, nearly a second and a quarter passes before we see it. The sun 95,000,000 of miles distant, or 400 times more than the moon, takes about eight minutes to let us know by its light that it is there. The distance of the planet Jupiter from our earth, at the time when it is greatest, is nearly 617,000,000 miles. This is six and a half times greater than our distance from the sun, and therefore its light requires fifty-two minutes to reach us. Lastly Uranus is 1,800,000,000 miles distance from this globe, and its light takes more than two hours to reach it.

Now these are planets; but the nearest *fixed* star to us, is in the constellation of Centaur, and is distant about eighteen billions of miles. Its light therefore takes about three years to reach us. A ray of light requires, before it reaches the earth, from a star of the

First Magnitude	- - -	3 to 12 years	
Second	" - - - -	20	"
Third	" - - - -	30	"
Fourth	" - - - - -	45	"
* * * *			
Seventh	" - - - - -	180	"

According to a conjecture first made by the great Herschel, the entire system of fixed stars which we behold on any fine night in winter, forms a single lens-shaped canopy. We, with our


SOLAR SYSTEM
JUPITER
COMPARATIVE MAGNITUDES
URANUS
NEPTUNE
EARTH
VENUS
MARS
MERCURY
ASTEROIDS
SATURN
SEGMENT OF SUN

sun, are situated nearly in the middle of a space, and all around us, at an immense distance, are situated these stars. We may consider the Milky Way as the edge and furthermost limit of this set of fixed stars, which form as it were two concaves, like two watch-glasses, on either side of us. The farther a number of objects are away from us, if we can see them at all, the closer they appear together, and that is how those infinitely distant crowds of stars appear collected in such masses that their light flows together into a whitish cloud. Hence the name of the *Milky Way*. The sun's average distance from the earth is 91½ million miles. The *light* of the sun is equal to 5,563 wax-candles held at a distance of one foot from the eye. It would require 800,000 full moons to produce a day as brilliant as one of cloudless sunshine. The amount of *heat* we receive annually from the sun is sufficient to melt a layer of ice thirty-eight yards in thickness, extending over the whole earth. Moreover, the heat and light stream off into space equally in all directions; of this vast flood only 2,300,000,000th part reaches the earth. It is said that if the heat of the sun were produced by the burning of coal, it would require a layer ten feet in thickness, extending over the whole sun, to feed the flame a single hour.

The *diameter* of the sun is about 850,000 miles. Its *volume* is 1,245,000 that of earth; that is to say, it would take 1,245,000 earths the size of ours to make a globe the size of the sun. Its *weight* may be expressed in tons thus: 1,910,278,070,000,000,-000,000,000,000. Such a number is meaningless to our imagination, but it represents a force of attraction which holds our own earth, and all the planets, steadily in their places.

The *planets*, of which our earth is an insignificant one, move in an invariable direction, around the sun. To get at some comparative idea of their size, let us fancy ourselves on a level field or common; let us take a globe two feet in diameter for the sun; then Vulcan will be represented by a small pin's head at a distance of about 27 feet from the center of the ideal sun; Mercury by a mustard-seed at a distance of 82 feet; Venus by a

pea at a distance of 142 feet; the Earth, also, by a pea at a distance of 215 feet; Mars by a small pepper-corn, at a distance of 327 feet; the minor planets by grains of sand at distances varying from 500 to 600 feet. We may place a moderate-sized orange nearly one-quarter of a mile distant from the central point to represent Jupiter; a small orange two-fifths of a mile for Saturn; a full-sized cherry three-quarters of a mile distant for Uranus; and lastly, a plum one and a quarter miles off for Neptune, the most distant planet we know.

Jupiter is 1,230 times the size of our earth; Saturn is 700 times. Mercury circles around the sun in 88 days. It has $10\frac{1}{2}$ times more light and heat than we have. Venus in many respects resembles our earth more than any other orb within the solar system; its year is 224 days and 17 hours long. It is conjectured that Venus is the abode of living creatures probably not unlike the inhabitants of the earth. Mars, again, is this globe of ours in miniature. Saturn, "the ringed planet," is more important in the scheme of creation than the globe on which we live. Its year is $29\frac{1}{2}$ years long. There is now a strong belief prevalent among astronomers that the planets are inhabited. Astronomy suggests thoughts of other forms of life than those with which we are acquainted. Take Mars, for example, which is distant from us 40,000,000 miles; it has seas, continents, rivers, atmosphere and all the other conditions of life; it is not so cold in winter there, as here, and not so warm in summer. If we cannot tell what the inhabitants there are like, we at least know that all the materials for happiness exist—land and water, mountains and valleys, clouds and sunshine; rain, ice and snow; rivers and lakes, ocean currents and wind currents, etc. With the poet we may begin to think more definitely and certainly than did he, that—

> "There's not one orb which thou beholdest,
> But in his motion like an angel sings
> Still quiring to the young-eyed cherubim;
> But while this muddy vesture of decay
> Doth grossly close us in, we cannot hear it."

THE MOON.

The mean distance of the moon from the earth is 238,000 miles. To travel this distance an express train would require about a year. The moon completes its revolution (*sidereal*) around the earth in about 27⅓ days; but, as the earth is constantly passing on its own orbit around the sun, it requires over two days longer before it comes into the same position with respect to the sun and earth. Its diameter is about 2,160 miles. It would require fifty globes the size of the moon to equal the earth. It always appears larger than it really is on account of its brightness. Whether the moon has inhabitants or not is an open question; but opinion seems to lean to the side of the moon's not being inhabited. For one thing, it has no atmosphere, or one so extremely rarefied that it has not yet been discovered. It is, however, very curious to think that if there be *lunarians*, they will see a *full earth* when we have a new moon,—a bright full orbed light fourteen times the size of what the moon is to us.

COMETS.

It is recorded that more than 600 comets have been seen. The first discovered and described accurately was by Necephorus, 1337. There are said to be 17,500,000 in the solar system. At the birth of Mithridates, two large comets appeared, which were seen for seventy-two days together. Their splendor eclipsed that of the midday sun, and occupied the fourth part of the heavens, about 135 B.C. A comet which terrified the people, from its near approach to the earth, was visible from November 3, 1679, to March 9, 1680. It enabled Newton to demonstrate that comets, as well as planets, are subject to the law of gravitation. A most brilliant comet appeared in 1769, passing within 2,000,000 miles of the earth. Its tail stretched across the heavens like a prodigious luminous arch, 36,000,000 miles in length. Dr. Herschel computed the length of the comet of 1811 at upwards of 100,000,000 miles, and its apparent breadth, at the same time, at 15,000,000 miles. It was visible all the autumn

to the naked eye. Halley first proved that many of the appearances of comets were but the periodical return of the same bodies. The revolution of Halley's comet is accomplished in seventy-five years. It appeared (as he had predicted) in 1759, again in 1835, and it is due in 1910.

Biella's comet has been an object of fear to many on account of the nearness with which it has approached, not the earth, but a point of the earth's path. It was first discovered by M. Biella, an Austrian officer, February 28, 1826. Its revolution is completed in six years and thirty-eight weeks. Donati's comet, so called from its having been first observed by Dr. Donati, of Florence, June 2, 1858, being then calculated distant 228,000,000 miles from the earth, had a tail 40,000,000 miles in length. It was nearest the earth on October 10, and on the 18th was near coming into collision with Venus. The great comet of 1861 was about 400 miles in diameter, with a long, brush-like tail. It traveled at the rate of 10,000,000 miles in twenty-four hours. On June 30 it was suggested that we were in the tail, there being "a phosphorescent auroral glare." No less than seven comets were observed in 1881. The most important scientific result obtained by observing them was due to successful photographing by Prof. Henry Draper, of New York.

GEOLOGY.

While the astronomer is studying the form and condition and structure of the planets, in so far as the eye and the telescope can aid him, the geologist is investigating the form, condition and structure of the planet to which he belongs; and it is from the analogy of the earth's structure, as thus ascertained, that the astronomer is enabled to form any rational conjecture respecting the nature and constitution of the other planetary bodies. Astronomy and geology, therefore, are even more than kindred sciences; they might be termed twin-sisters on a voyage of discovery in the realms of material nature. When the astronomer first surveys the *concavity* of the celestial vault, he finds it studded with luminous bodies, differing in magnitude and luster, some mov-

ing to the east, and others to the west ; while by far the greater number seemed fixed in space ; and it is the business of the astronomer to assign to each of them its proper place and sphere, to determine their true distance from the earth, and to arrange them in systems throughout the regions of sidereal space.

In like manner when the geologist surveys the *convexity* of our globe, he finds its solid covering composed of rocks and beds of all shapes and kinds, lying at every possible angle, occupying every possible position, and all of them, generally speaking, at the same distance from the earth's center. Everywhere we see what was deep, brought into clear relation with what is superficial — what is old with what is new. The business of the geologist then is to discover how the rocks he meets with come to be where they are ; he tries to fix their different ages ; to find out when all this happened, and what causes brought about these things. Generally it may be said that the results attained by the science of geology have been quite as marvelous in their own way as those achieved by astronomy. For a considerable time it seemed to many that this investigation which deals with rocks was taking away from us that religion which is founded upon a rock ; but maturer consideration has demonstrated that this is not so, and science in this direction, as in every other, amongst any but uneducated persons, is proving itself more and more the helpmeet of that knowledge of God, and His purposes, on which all true religion is ultimately founded.

WHY SEA-SHELLS ARE FOUND AT GREAT HEIGHTS.

The action of subterranean forces in breaking through and elevating strata of sedimentary rocks — of which the coast of Chili, in consequence of a great earthquake, furnishes an example — leads us to the assumption that shells found on the ridge of the Andes, at an elevation of more than 15,000 feet, may have been conveyed to so extraordinary position, not by a rising of the ocean, but by the agency of volcanic forces, capable of elevating into ridges the softened crust of the earth.

SAND OF THE SEA AND DESERT.

That sand is an assemblage of small stones may be seen by any one; yet, how few are aware of the similarity of the nature of the sand of the sea and of the soil on which grain grows. Sand is merely soil in its first stage. It is formed by the wearing away of granite rocks, and becomes fertilized by many agencies, as, for example, by water, and even by the worms on which we tread.

THE CHALK FORMATION.

It has been considered by a distinguished naturalist extremely probable that every particle of chalk in the world has at some period been circulating in the system of a living animal.

ANTIQUITY OF GLACIERS.

The importance of the glacier agency in the past as well as the present condition of the earth, is undoubtedly very great. One of our most accomplished and ingenious geologists has, indeed, carried back the existence of glaciers to an epoch of dim antiquity, even in the reckoning of that science whose chronology is counted in millions of years. Glaciers are vast fields of ice or concrete snow, which are formed in the hollows between lofty mountains, and abound in the Swiss and Tyrolese Alps. As many travelers on the ocean know, they often get floated out to sea, and form at certain periods of the year a great danger to ships. If we bear in mind that in long past days, water was not distributed over the globe as it now is, and that many lands, on which cities now are built, were once under the waves, we shall be prepared to understand some of the wonderful things that glaciers have done. The huge bowlders of rock that are sometimes found heaped one upon another on the tops of hills, and which people used to imagine had been placed there by giants or witches, were in reality carried and dropped there by glaciers.

On leaving the land they carried with them huge masses of stone and soil, which, as they melted, they dropped. Many strange highways have thus been formed by the action of ice.

In Edinburgh, Scotland, the famous high street was made thus, and the magnificent rock at the end of the street, on which the castle now stands, was placed there by a glacier! In Hugh Miller's "Schools and Schoolmasters," an interesting account of this is given. As an instance of the power of ice in this way, a writer says that in Lapland he has found large granite bowlders weighing several tons actually entangled and suspended like birds' nests in the branches of pine trees, at heights of thirty and forty feet above the summer level of the stream!

CAUSES OF EARTHQUAKES.

Various causes may be conceived as possibly producing the shock. For example, when the roof of a subterranean cavity collapses, a concussion must be produced which may have the effect of an earthquake at the surface. In limestone countries, such as Carniola, the ground is honeycombed with grottoes and passages, and slight shocks of earthquake are of frequent occurrence, due no doubt to the falling in of some of these underground caverns. More violent effects might arise from the collapse of large emptied volcanic reservoirs, as perhaps has occurred at the extinct volcano of Ischia. Again, the rocks of the crust are in a state of continuous strain due to various causes, and especially to the gradual contraction that arises from the slow cooling of the planet. From time to time there probably come moments when they can no longer bear these stresses, and when consequently they snap asunder and readjust themselves in a new position of equilibrium. It is possible that explosive steam may be the cause of earthquake shocks, even where no actual volcano is formed. We may suppose, for instance, that sea-water sometimes gains access to the highly-heated interior of the earth. The sudden generation of steam as the water passes out of the spheroidal condition can hardly fail to cause an explosion, and thus to start an earthquake. Or if a large mass of steam imprisoned within some heated subterranean cavity be suddenly condensed by access of cold water

from above, a violent shock will take place. One of the great problems in the physics of the earth is if possible to trace out individual earthquakes to their several modes of production. The task is a difficult though by no means a hopeless one. But until some considerable progress has been made with it, earthquakes must remain one of the most curious and interesting puzzles that can engage the ingenuity of scientific men.

GREAT EARTHQUAKES.

It is recorded that upwards of 60,000 persons perished in the great earthquake of Lisbon in November, 1755; 10,000 in another in Morocco; 40,000 in Calabria, 50,000 in Syria on one occasion, and probably 120,000 in the same country in the time of Tiberius, A. D. 19. In the year 526, at Antioch, 250,000 persons are said to have perished, and seventy-six years afterwards a second earthquake destroyed 60,000 persons. At Pekin, China, in November, 1731, 100,000 people were swallowed up. In 1797, the whole country between Santa Fé and Panama was destroyed, including Cuzco and Quito; 40,000 persons were buried in one second. In March, 1860, two-thirds of the city of Mendoza, South America, were laid in ruins, and 7,000 lives lost. In 1868 a terrific earthquake visited Java, destroying property estimated at $300,000,000 when 25,000 souls perished and 30,000 rendered homeless. Again in 1883 the island of Java was overwhelmed by earthquake and volcano, 130,000 inhabitants lost their lives, and the very features of the country were so changed that new surveys of her coasts had to be made. The most recent earthquake occurred at Charleston, 1886, with great destruction of property and much suffering; the shock was distinctly felt at Chicago, and occasioned considerable alarm. A calculation of the number of recorded earthquakes up to the middle of the present century, gives for the American hemisphere 717, and for other parts of the world, 4,609. The destructive character of these disturbances fully warrants the assertion that they are, of all terrestrial events, the most fearful.

VELOCITY OF WIND.

The following table shows the pressure of the wind at different velocities:

DESCRIPTION OF WIND.	VELOCITY.		PRESSURE PER SQUARE FOOT IN LBS.
	MILES PER HOUR.	FEET PER MINUTE.	
Hardly observable.	1	88	.005, or about $\frac{1}{12}$ an oz.
Just perceptible.........	2	176	.02, " ⅓ "
	3	264	.045, " ¾ "
Light breeze...............	4	352	.08, " 1⅓ "
Gentle, pleasant wind......	5	440	.125, " 2 ounces.
Fresh breeze..............	10	880	.5, " 8 "
Brisk blow................	15	1,320	1.125, " 1 lb. 2 oz.
Strong wind...............	20	1,760	2.
Very strong wind..........	25	2,200	3.125
High wind..............	30	2,640	4.5
	35	3,080	6.125
Very high wind...........	40	3,520	8.
Gale......................	50	4,400	12.5
Violent gale..............	60	5,280	18.
Hurricane	80	7,040	32.
Tornado...................	100	8,800	50.

From the above table it will be seen that with a velocity of four or five miles per hour, the pressure is less than two ounces per square foot of wind surface, and that its effective force depends entirely on the velocity.

CHAPTER XX.

HOME HINTS IN SCIENCE.

WHY AND WHAT WE BREATHE.

WHEN we come to think of it, it is a curious thing that we have to breathe. Considering the amount of foul air, and the many sicknesses and deaths that are caused by people either inhaling poisonous gases, or being placed in circumstances where they cannot breathe at all, as in the case of drowning, it may seem to some as if it would be better not to have to perform the operation at all. But, in reality, breathing is of the last importance to the human frame, as it is by it that the blood is purified,—and pure blood is necessary to life. In breathing, the oxygen in the air inhaled into the lungs combines with the carbon in the blood, when carbonic acid is formed and exhaled. With every breath this operation is accomplished. The air we exhale, charged with carbonic acid, being heated by the body and thus rarefied, is lighter than the outside atmosphere, and so ascends; but as it cools down it becomes heavier and descends. Accordingly, rooms should be ventilated from below as well as from above. Carbon is an elementary substance, and is found in great abundance in nature. It exists in three forms, namely: charcoal, graphite, and diamond. The reason why it is dangerous to burn charcoal in rooms is because the carbon of the charcoal unites with the oxygen of the air, forming carbonic gas, just as we do in breathing. Now this is a poison. If a person were to be shut up in an air-tight compartment of even considerable size, as soon as he had exhausted the oxygen

in the air he would speedily become asphyxiated and would die. The burning of charcoal in a room only accomplishes this more speedily, as more oxygen is consumed and carbonic acid generated more rapidly.

THE ATMOSPHERE.

The atmosphere is composed of twenty-one parts of oxygen and seventy-nine parts nitrogen. Oxygen is an elementary gaseous body, the most electro-negative element known. When united with twice its bulk of hydrogen, it forms water, and is found in compound with nearly every known element. An element is a body composed of but one kind of atoms. A compound is a body composed of two or more kinds of atoms. Combustion is the rapid union of elements in forming compounds. Nitrogen is an elementary gaseous body, and the second electro-negative element known. It is found in the air and in nearly all vegetable and animal tissue. Its use in the atmosphere is simply to dilute or weaken the oxygen, and it is not changed by respiration. The reason why blowing a fire causes it to burn more brightly is, because, with each current of air it receives a fresh supply of oxygen; on the other hand, if a lighted candle be placed under a closed vessel it will soon go out, because the oxygen will be consumed and the nitrogen will neither burn nor support combustion. Hydrogen will not support life or combustion; but when pure it will burn with a steady bluish light, and, if mixed with air, it will explode when brought in contact with fire.

ILLUMINATING GAS.

It is hydro-carbon, or a compound of hydrogen and carbon; the hydrogen unites with the oxygen of the air, forming water, the carbon becomes heated to a glow, and thus gives the light. This gas is dangerous to breathe, and if allowed to escape in quantity, in a building, is very liable to explode if a light be taken near it. The sense of smell readily detects an escape. Other sources of hydro-carbon in our dwellings are decomposing animal and vegetable substance of drains and water-closets.

Great care should be taken to secure effective drainage, and to keep the drain-pipes in order, as this gas is most poisonous.

HEAT.

Heat is a form of energy. It consists of vibratory motions of particles of matter, or results from such motions, and gives rise to the well-known sensations of warmth and cold. Its effects are expansion, fusion, evaporation, and decomposition. The principal sources of heat are the sun, chemical action, mechanical action, sound, light, and electricity. The reason why burning-glasses set fire to combustible substances is because they gather all the rays of heat that fall upon them to a single point or focus, thus making the heat more intense at that point. Fire is the rapid union of elements. Smoke is the small particles of carbon which have not been consumed by the heat. The reason that smoke ascends is because it is held in heated air; when the air cools down the smoke settles. Sometimes the smoke will be observed to ascend more directly than at others, the difference being occasioned by the varying density of the atmosphere. Heat is diffused by conduction, convection and radiation. *Conduction* is the process by which heat passes from the hotter to the colder part of a body. Different bodies conduct heat more or less rapidly in proportion to the density of their particles, as heat travels from particle to particle, and the closer these are the faster heat gets along. Thus steel is a swift conductor; wood a very indifferent one, and wool or sawdust the poorest, by a long way, of all. *Convection*, or conveying of heat, is the method of diffusing it by actual motion of heated fluid masses; as when hot water rises from the bottom of a vessel and conveys heat to the colder water above. *Radiation* of heat is the propagation of heat by ether.

Heat can be reflected, and the taking off of heat by the body to which it is transmitted is called *absorption*. Every one has noticed that some articles, as marble or iron, feel colder to the touch than others when, undoubtedly, they are at the same temperature. The reason of the phenomenon is that they are good

conductors, owing to the density of their particles, and they thus conduct the heat away from the hand more rapidly. If heat were applied to the other end of an iron instrument, it would convey it just as speedily to the hand. And in the same way we can understand how ice wrapped up in flannel is longer in melting than if placed in an iron box. The heat, to reach the ice, must travel from particle to particle of the flannel, and thus a long time is taken before it reaches in any quantity the ice ; in other words, flannel is a bad conductor. Flannel affords warm clothing for the same reason, for the heat of the body cannot get away so rapidly as through cotton or silk. A curious fact in regard to heat is connected with the formation of ice ; water, when it reaches freezing point, is converted into crystals, which, coming in contact with one another in the formation of what is called ice (and which in reality is an infinite mass of crystals), and expanding, generate, and give out heat, so that it is frequently warmer when frost sets in. Smooth bright surfaces are the best reflectors of heat, whilst black articles absorb the heat. Thus a brass kettle, as it reflects the heat, will not boil so rapidly as one covered with lampblack ; and dark clothing in summer-time absorbing the heat more rapidly than clothing of a light color, which reflects it, will cause discomfort. Therefore, in tropical climates, white is the favorite raiment.

THE CAUSE OF WIND.

The temperature of one locality is not the same as that of another, consequently the air at some places is lighter than it is at others ; the lighter air is forced upwards by the heavier air, which, as it flows in, partakes of a circular motion which we call *wind*. If a great difference in temperature arises, a sudden change of air takes place and forms a *whirlwind, hurricane* or *tornado*. This flow of air, on account of heat, is the cause of a number of familiar phenomena ; for example, the reason that air ascends a chimney when a fire is burning in a room, is because, being heated by the fire, it is lighter than the air in the room, and is thus forced up ; then again it will be observed that

the flame of a candle terminates at a point; that is because the cold air rushes to the flame on all sides and is carried upwards; a lamp chimney increases the brilliancy of the flame, because it conducts an increase of air to the flame.

THE CAUSE OF DEW.

At night the earth, and all objects upon it, radiate the heat received from the sun during the day, and become colder than the air; and the vapor of the air, coming in contact with the cooler objects, is condensed and deposited in the form of *dew*. Dew is heavier on some objects than others, because they are better radiators of heat. Heavy dews foretell rain, because they show that the air is well charged with moisture. Hoar frost is frozen dew.

THE CAUSE OF RAIN.

When a warm current of air, containing a great amount of moisture, comes in contact with a cold current, the moisture is condensed and falls in rain. Sometimes a sudden fall of temperature will produce rain without forming visible clouds. The reason why more rain falls in March and April than in July and August, is because the changes in temperature are more frequent in the former months, and every fall of temperature in the air condenses its vapors. The weather, however, is not necessarily colder before rain, because this change of temperature is in the upper currents of air, and not on the surface of the earth.

SNOW.

Snow consists of the watery particles of the atmosphere frozen, for the most part, in a crystalline form. It is white on account of the aggregate reflection of light from the sides of the minute crystals. High mountain peaks are covered with snow, because the upper regions of the atmosphere are intensely cold.

HAIL AND SLEET.

If snow, in falling, passes through a warm current of air it is partially melted and becomes *sleet*.

If the raindrops, in falling, pass through a current of air of low temperature, the drops become frozen and fall as *hail.*

LIGHT AND OPTICS.

Light travels with the velocity of 192,000 miles a second, so that a wave of light issuing from the sun requires eight minutes before it reaches the earth. The finding of the velocity of light is no less wonderful than the velocity itself. This was discovered in 1676 by the Danish astronomer, Olaus Roemer. Light is reflected from any object which lies in its path; perhaps this comparison is hardly correct, for all the light does not rebound from the reflecting surface, but only a portion of the ray is reflected, the rest being absorbed by the body, or, if transparent, passing through it. If the surface be perfectly smooth, the light which comes from any object is reflected from the surface unbroken, just as it comes from the object; this is the case with a mirror, and it will be noticed that the image is apparently just as far behind the glass as the object is really before it. This fact has been taken advantage of by the well-known exhibitors of illusions, the best known of which is the "Sphynx." The exhibitor prepares a three-legged table, and fits two sheets of looking-glass from one leg to the other two legs. That side of the table which has no looking-glass between its legs is away from the audience. The floor of the table is covered with green baize and the sides hung with red cloth, the audience seeing the reflection from the looking-glasses imagine they are looking under the table to the back of the stage. Of course the owner of the head is kneeling under the table.

We have all of us observed the beautiful colored image formed by a ray of light passing through a triangular-shaped bar of glass called a prism. The ray in passing through the prism is delivered from its original direction and appearance, and we have projected upon the wall or screen a long streak of gorgeously-colored light. While light thus treated is said to be "decomposed," and the ray is said to be refracted from its

original course, Sir Isaac Newton was the first to discover the power of the prism, and to show that ordinary light was composed of seven colored rays united in one. This band of colored light is called the "spectrum." Dr. Wollaston discovered in 1802 that the "spectrum" from a ray of sunlight was crossed by dark bands varying in thickness and definition. Herein lay the foundation of one of the greatest marvels of science. In the year 1815 a German optician, Fraunhofer by name, discovered that the spectrum was crossed by at least 600 dark lines which have ever since gone by the name of "fraunhofer's lines." In 1835 Wheatstone discovered that these different lines were produced by different metals, and this discovery has resulted in a way being found by which the materials of which the sun is composed can be ascertained. The instrument used for this purpose is called the spectroscope.

As has been shown the ray of light consists of seven distinct colors, there is another class of colors apparent in every substance, which are known as the colors of natural objects. The natural color of an object is that in which it appears when illuminated by the pure white light of the sun; it is called red, or blue, when it so appears by daylight. Now if an object be illuminated by white light, and yet appear of another color, the cause of the change must be looked for in the influence which the surface of the body exercises on the waves constituting the white light. The effects of this influence are very different, according to the nature of the coloring matter with which the object is provided; in cases where the rays of light are absorbed entirely, the object is called black, when the surface of a body has the property of absorbing all the colors of the spectrum with the exception of one—the red for example—that body appears red to us by daylight because this color alone is reflected to the eye, when on the contrary it has the power of absorbing some of the rays—the red and orange for instance—and of reflecting the others, namely the yellow, green and blue, the color of the object will then be that produced by the mixture of

the unabsorbed—the reflected colors. It is therefore easily understood why so many different colored objects should be seen in nature, with such an infinite variety of tints.

THE RAINBOW.

This beautiful arch in the heavens is caused by the refraction and reflection of light by the drops of falling water.

A HALO.

This is a luminous or colored circle seen around the moon under certain conditions of the atmosphere. It generally precedes wet or stormy weather.

> "Then up and spake an old sailor,
> Had sailed the Spansh main:
> I prithee put into yonder port
> For I fear a hurricane.
> *Last night the moon had a golden ring,*
> And to-night no moon we see."

The cause of the halo is the refraction of light by minute crystals of ice floating in the higher regions of the atmosphere.

STARS AND METEOROLITES.

The reason of the twinkling of stars is that there are a great many non-luminous bodies in space and when they pass between us and a star, they cut off its light just for an instant, thus causing the appearance of twinkling. *Meteorolites,* or shooting stars, are not stars proper, but are non-luminous bodies coming in contact with the earth's atmosphere which becoming ignited by their friction upon the air have the appearance of stars. The reason of their being seen in such numbers between the 12th and 14th of November is that the earth is at that time passing through space where they abound.

TWILIGHT AND SUNSET.

Twilight is caused by the bending or reflecting of light by the atmosphere. After the sun has gone down, its rays still catch the upper air which reflects them upon the earth. When there is little or no moisture in the air there is no perceptible twilight, whilst in such countries as England it is of quite long

duration. The cause of the colored sky at sunset is that the sun's rays are partially decomposed by the vapor that is in the atmosphere; a highly colored sunset predicts a storm because it shows that the air contains a great deal of moisture.

ELECTRICITY.

Electricity is that mode of motion which is manifested by attraction and repulsion. It is best understood by its effects.

The *electric light* is produced in two principal ways, namely: by incandescence or glow, and by the electric arc. The electricity is produced either from a powerful battery or from a magneto-electric machine. In the first method the electricity passes through the platinum or carbon, and heats it until it glows. In the second case, two points, usually of carbon, are separated a short distance, and the passage of the electricity over this distance, carrying with it heated particles of carbon, gives the light.

LIGHTNING AND THUNDER.

Lightning is caused by electricity passing through the clouds to the earth, and the clouds becoming oppositely charged, the tension of the electricity overcomes the resistance of the air between the earth and the clouds, and passes through it. Its zigzag course is determined by its seeking the path where there is least resistance. Heat lightning is an unsteady glow of lightning seen near the horizon, and is simply the reflection of lightning so distant from us as to be invisible. The danger of standing near a tree during a thunder storm arises from the fact that its height and the fact that it is a good conductor create a probability of its acting as a conductor for the electricity; in the same way it is dangerous to be near a fire during a thunder storm as the smoke and flame are conductors of electricity. The safest place is in the center of a dry room, away from all metals and other conductors of the fluid.

Thunder is caused by the sudden rush of air into the vacuum which the electricity, as it darts with inconceivable rapidity, leaves behind it. When it is near, the sound from all parts of the

flash reaches us at the same time, and there is a crash, but when the lightning is distant from us the sound does not reach us at the same time, and instead of a clap of thunder there is a prolonged rumble.

SOUND.

Sound is caused by the vibration of air acting on the auditory nerve. Its rate of speed is about 1,090 feet per second. It will be observed that sound seems to travel better in some conditions of the atmosphere than in others. On a damp day, for instance, one hears more distinctly than on a dry one, the reason being that damp air is the better conductor of sound. To ascertain the distance of a thunder storm, if the number of beats of the pulse be counted from the time of seeing the flash to the hearing of the thunder, five beats will represent a mile.

HEIGHT OF THE ATMOSPHERE.

The atmosphere envelops the earth to a height of from 50 to 200 miles; its pressure on the earth's surface is fifteen pounds to the square inch, so that the pressure on the average man is 30,000 pounds, or fifteen tons. The pressure, however, is not felt because it is equal on all sides of him and internal as well as external. Its force is shown by the fact that it will raise water in a pump thirty feet. A column of water thirty feet high and one inch area across section weighs fifteen pounds.

The reason that a stove smokes when first lighted is because the air in the chimney is at the same temperature as the air in the room; as soon, however, as it becomes heated the chimney begins to draw, and the annoyance ceases. The best means of conveying air to fires, is by tubes built in the wall communicating with the outer air and terminating beneath the grate. Chimneys smoke in damp weather, because the heated air in giving off its moisture becomes heavier than the outer air.

THE BAROMETER.

The barometer is an instrument for measuring the pressure of the atmosphere. There are two forms; the mercurial, con-

sisting of a glass tube over thirty inches long, filled with mercury, and the aneroid, a cylindrical box of metal, with a hand to indicate the pressure. The rising of the barometer generally presages fair weather; the falling, the contrary; a sudden change in the barometer, a sudden change in the weather; a gradual change in the barometer, a gradual change in the weather. Dry air is heavier than moist air.

THE THERMOMETER.

The word thermometer means a measure or measurer of heat. It is an instrument by which with the aid of mercury the temperature can be told. Mercury, like other metals, expands with heat and contracts with cold; and as it expands it will evidently take up more room and so ascend or fill up the tube of the instrument, whilst as it cools it contracts and descends.

WHY RAIN WATER IS SOFT.

Rain water is soft because it is condensed evaporation, and water on evaporating does not carry with it the minerals in it. The reason why spring water is more difficult to wash with is because the minerals in the water act contrary to the soap, destroying its power of action. Ordinary soap will not act at all in seawater, but careful housewives, in rinsing clothes where there are colors that are apt to run, put a handful of salt into the water which has the effect of preventing any such tendency. Spring water is more palatable than distilled water because it contains carbonic acid; in the process of boiling this is lost.

CHAPTER XXI.

THE FINE ARTS.

WHAT IS ART?

IF ANY one were to ask the question, "what is art?" there are very many who would be puzzled to give a satisfactory answer. One may know, in a general way, what a thing is, without having the ability to define it. In the ordinary affairs of life we have mostly to get along with only a mere acquaintance or recognition of subjects and things, and for practical purposes this is quite sufficient. A man may be able to distinguish and deal in precious stones and metals without knowing much, if anything, of their nature. A dry-goods man may sell silk and wool and cotton for half a century, and continue to be ignorant of their origin and essential properties. Most of us go on living our life in those wonderful bodies of ours with amazingly little understanding of physiology. A Latin poet sings:

> Felix qui potuit rerum cognoscere causas.
> (Happy is he who knows the origin of things.)

The mind which is at all cultivated refuses to be satisfied with a mere mass of details. There is an instinctive desire to get down to principles. Everything, indeed, which has a lasting existence rests on a principle. Get at that and the superstructure of knowledge is founded securely. Mere memory is fortified by reason. When we know *why* a thing is so, and not simply *that* it is so, we have obtained a key to the door of knowledge which forgetfulness can not easily steal from us. A definition then of a science or an art which has been thoroughly

grasped and understood becomes extremely valuable. It is like the compass on board ship, or the polar star in the heavens. From it we can at need discover whither we are steering.

Some one asks us then, "What is art?" We might reply music is an art, sculpture, poetry. He might say, "Yes, these no doubt are arts, but what makes them so?" "What is the very essence of art?" "Why is art art; why is it itself and not something else?" Then probably we should feel puzzled to give a reply satisfactory even to ourselves. Now let us see if we cannot solve the difficulty so that never again such questions should cause us bewilderment, even when we ask them of ourselves, as most of all we frequently should do.

Certain truths may be enumerated, to begin with, which will have their elucidation afterwards. "All art is in its origin connected with religion." It is not out of mere *utility* it springs, although it is often superimposed upon it, as, for example, architecture on the mere building. The fine arts, as they are called, really begin where utility ends. Art may be said to exist for itself. It is a creation of the soul. There are longings or needs in our very being which art satisfies just as food meets the cravings of hunger. We must free our minds of the idea that true art, in any of its forms, is the mere result of idle fancy, of wealth or leisure, of caprice in any shape. Art is what it is, essentially, or it is not art. We cannot determine art shall be this or that at our pleasure. It is as much a real existence as is man man, or nature nature. Its principles are certain and fixed, and this does not contradict the fact that its manifestations are infinitely various. The sculptor, the painter, the dramatist will impress on his creations the marks of his own individuality, but there will still be a center at which they altogether meet. No two human beings are, in every respect, alike. Every Jack and every Harry has some feature peculiar to himself which distinguishes him from every other Jack and every other Harry. Each individual of us feels, sometimes with pardonable pride, and sometimes, perhaps, although not so often, with a certain degree

of humility, that there is little practical danger of our being taken for anyone else. And yet think of the number of people in the world. Is it not a wonder that we do not frequently get mixed up? Nor can it be said that it is the milliner or the tailor who puts on us our stamp of individuality. The lower animals of the same kind are each distinguishable from the other. A shepherd on the hills, or on the plains, can tell every individual sheep, and no doubt in a community of grasshoppers, or ants, there are individual marks of difference. No two trees of the same species are precisely alike. Yet all men are the same in being men, and all flowers in being flowers. Thus art is infinitely various in its manifestations, but at its root it is always the same. In our appreciation of a work of art the same truth comes out. We all admire the grand and beautiful, and have an aversion to the unsightly and ugly, but still how infinitely varied is taste. Do we not perpetually differ as to the degree of our admiration or dislike? And do not special objects attract and repel one which are perfectly indifferent to another? In our judgments in regard to music, the drama, or some painting or masterpiece of sculpture, we are, without the possibility of avoiding it, influenced by our character, talent, age, temperament, education and the very climate we live in.

All of us are possessed of certain passive artistical powers. These are our bodily senses, or rather some of them, for all the senses are not applicable to art, just as all sights and sounds, on the other hand, do not contribute to its creations. The two senses which may be said almost exclusively to be subservient to art are sight, or seeing, and hearing. In addition to the senses, art uses and appeals to the emotions and passions of the soul.

The sense of seeing makes possible the arts of painting, sculpture, architecture, costume and gardening. Hearing in its turn gives us music and eloquence. Hearing was also necessary for the origin of poetry, although now it is non-essential.

Hearing and sight together come into play in dramatic acting. We are influenced through sight by beauty, symmetry,

gestures, facial expressions, costume of the actor, by the physical impersonation of the character which he represents. He is a living portrait. He is animated sculpture. He is dramatically successful so far, if he exactly embodies, or rather ideally embodies, the creation of the dramatist. For the time being, Charles Kean, McCullough, Booth or Irving is forgotten, and we are in Denmark in the presence of Hamlet; transported to France, we gaze on Louis XI.

The sense of hearing plays a no less—perhaps, indeed, a nobler—part. Through it enter into the soul the lofty sentiment, the impassioned utterance, the flashing wit of tragedy, the humor and pathos of comedy. The voice falls on the ear, stirring a thousand varied emotions in the soul. How the heart is melted, steeled, thrilled, exalted, depressed, by the artistic cadence of that most marvelous of instruments the human voice! What can it not do with us? Transported, vanquished, moved to tears and laughter, not by the words but by the way they are uttered. It was said of Rubini that he had tears in his voice; and we have all met with one or more of those exquisitely modulated voices which it was delight simply to listen to. We have felt inclined to plead, "Do not mind what you say, only speak."

In this view of dramatic acting we have at least a glimpse of what a noble thing it may be, and ought always to be. It may be said to be greater than any single art, in that it embraces them all—presses them in a body into its service. On the stage, painting, sculpture, architecture, music, poetry and eloquence have each and all their proper place. Dramatic art is thus art's climax. Ruskin says somewhere: "The highest thing that art can do, is to set before you the true image of the presence of a noble human being. It has never done more than this, and it ought not to do less." Such is the ideal of the drama.

Art has for its object to minister to the sensibilities of the mind or soul. We are conscious in ourselves, in our very nature, of certain needs which are far deeper and more

lasting than the mere animal passions. We are capable of admiration, hope and love—three things a great poet says we live by; and those spiritual emotions, so to speak of them, require to be called into action, and satisfied. A humdrum, bread and butter existence is after all not enough for a man. He needs something different, not because he is bad, but because he is good. If you keep him on the treadmill of life, or if he keeps himself in ignorance there, he is apt to become a drunkard or a money grub, or something else always unloveable, unadmirable, sordid and mean. Art steps in and stirs us up. It astonishes us by discovering to ourselves that we have a soul above buttons. To quote Ruskin again, he says "that the fine arts demand the exercise of the full faculties of heart and intellect." If anything debasing is found in them, that is not their fault, but because something alien and false has been imported into them. All true art is founded on and tends to morality.

From what has been said it will be recognized that mere pleasure, in the narrow sense, is not the object of art. Nor is its object to inflict pain. There is often something higher than either of these taken singly. In music the most exquisite effects are produced by a union of discords. There is such a thing as contrapunctal complication. The effects of art on the mind are often produced in an analogous way. It may move to willing tears. There is a blending of pleasure and pain which we would not readily forego. The soul seems to rouse itself, and realize its own nobleness and capacity, in presence of the direst tragedy. Jessica says, "I am never merry when I hear sweet music." Shelley in his "Skylark," "Our sweetest songs are those that tell of saddest thought;" and Coleridge in his charming Genevieve—

> She loves me best whene'er I tell
> The tales that make her grieve.

Through the senses the mind perceives certain qualities or properties of things. Seeing and hearing make us familiar with the external world. Thus we become acquainted with the

attributes of color, form, sound, size, motion and the like.

Upon these art takes hold, and by selection and combination forms its creations. Painting appropriates color and surface form; sculpture, form in all its dimensions; music appropriates sound, and dramatic art may be said to combine all three.

We go a step farther when we come to consider the part played by the emotions and passions of the soul. Art could not be said to be art apart from these. Every pleasurable emotion has not an artistic source. To a considerable extent the delight we experience through the organs of sight and sound is shared by the lower animals, and some of them may be considered no mean artists. Birds listen with pleasure to good music. Who has not marked a favorite songster, with head to one side, critically taking in some piece that is being played? What rivals they are of each other! It is said that the Arabs cheer their wearied and overburdened camels, when crossing the desert, with music, and that they thus get work out of them when nothing else would rouse them to exertion. We find in birds again the love of gaudy plumage, and they show often the greatest skill in the architecture of their nests. Any such indications of an artistic bias, however, halt at a certain point. We deal with a known quantity which is never exceeded, and we call it instinct. In man the action and the consequences of the action of the emotions and passions cannot be measured thus. When in presence of a work of art we can hardly tell how two different individuals will be affected, except in a general or rough way. The emotions are capable of infinite training. The passions vary in intensity beyond computation. On these depend our taste and our opinions; habit and cultivation lend their aid to create differences; until it is probable that in the presence of some great work of art,—a noble landscape, a battle-field, a touching home-scene,—no two individuals experience precisely the same amount of emotion. So with music, and so with dramatic art. In regard to Wagner, for example, we can fancy that whilst one of an audience would sit entranced during the performance of

"Lohengrin," another might feel inclined to yawn, and a third to run away. In artistic creation similarly the emotions and passions stimulate the action of the intellectual faculties. A great poet we recognize must have a heart as well as a head. A cold, calculating, even, never-up and never-down nature, is not the stuff of which a Shakespeare is made.

We have seen then, so far, the part that the senses play in regard to art. Sight and hearing are the ministers of art. The other senses may be called art's handmaids. Sight and hearing conduct impressions inward to the emotions and passions, which breathe into them the breath of life, and the intellect then shapes them into or stamps them as ideas. Ideas are the spiritual material with which art works, and it gives them expression in what are called the fine arts — painting, sculpture, music, and the rest. It is by the combination of ideas that the various results are accomplished. The mind is utterly unable to create any new idea, or object, except by this means. The materials must always be provided. But the activity of the mind makes the power of combination inexhaustible. The most magnificent efforts of poets and painters have been accomplished by the harmonious combination of simple ideas or objects. If we take, as an instance, a thrilling story: we read it from beginning to end with breathless interest. It is intensely real to us. Every character in it is as living as ourselves. We follow the plot, and are trembling, exultant, anxious, hopeful, as we pass from page to page. We are irritated when the hero or heroine does some foolish thing, or is blind to what, to us, is as plain as a pikestaff. We hate the villain and long to see him hanged. Well, then, the story is a fiction and we know it. Those events never happened precisely as they are narrated in this book. Why do they affect us so, then? Are we the silly dupes of any combination of absurdities or improbabilities? Certainly not. We recognize that all these events might have happened, and that they have individually, in one connection and another, really occurred. The story does not outrage experience, but, quite otherwise, is perfectly true to it. The

author — the artist — has simply shown genius in the choice and arrangement of his materials. There is nothing absolutely new in the materials. He has not created his book as God, according to Genesis, created the world — out of nothing. But still the book is new. It is after all a creation of the highest kind. It is not a piece of patchwork; it is not a skillful imitation. It is itself, neither more nor less, just as a human being is. All the words of which a poem is composed are in the dictionary, but there they do not form a poem. For that, the genius of the poet or the maker is needed. All the colors that the artist uses are in the paint-box, but they form there no picture. It is for the painter to give them harmony in combination.

We begin to see now that, although the channel of art is the senses, the fountain of it is in the mind, and that it calls into play the whole faculties of the soul. Art, we now perceive, is the exercise of man's consciousness on the materials of experience, and the various arts are its modes of expression. It selects from its exhaustless storehouse whatever suits its purpose, and, combining its material harmoniously, and in a living way, presents its creation to the world.

In this view, when we think highly of art we think highly of man, and if we regard man as noble so do we regard art, for art is man at his best. And "What a piece of work is man! How noble in reason! How infinite in faculties! In form, and moving, how express and admirable! In action, how like and angel! In apprehension, how like a god!"

This further may be observed, that art can never be said to be completed or perfected. If it be true that the world of humanity develops, so must it be true of art. Every step taken upwards by mankind will be a step taken upwards by art. Every advance in civilization will necessitate a new departure in art, which is the expression of man at his best. And, alas, every retrograde movement, every declension in morality, every successful inroad of corruption, must witness the deterioration of art. In this sense most truly does it "hold the mirror up to

nature." Moral pollution and intellectual decay witness its debasement. Universal anarchy, if that were possible, would witness its death. "Art is long!" Yes, art is immortal, even as the soul is immortal.

Art, then, in its essence consists in the embodiment and development of the most refined, pure, and noble ideas that spring from, or are called forth in, the soul. And this is true of all the arts.

Any account of the origin of art would be incomplete without some notice of the tendency in the human mind to imitate. We see this tendency very strikingly exhibited in children, and in the beginnings of art it is as clearly discernible. In one sense, all the five principal arts — poetry, sculpture, painting architecture and music — aim at producing an imitation. If we are dissatisfied with a statue, we tell the sculptor that no real legs or arms could ever resemble those he has fashioned. To a painter we say that the perspective is bad, his coloring unbearable, because the opposite of what we see in nature. Another illustration of the presence of imitation is furnished by what occurs to all artists. To begin with, they work after models, endeavoring to reproduce the very appearance of things, and doing so with the greatest minuteness. But although all this is true, literal imitation is not the end of art, and indeed may become an obstacle to its progress. Otherwise we should consider the makers of casts, or photographs, among the greatest of artists. An artist who should devote all his time to producing pictures or portraits bearing the characteristics of photographs is unworthy the name. He may produce on canvas every spot and wrinkle of the original, and succeed in finishing a portrait so perfectly that it will almost seem to breathe. The spectator marvels, but remains unaffected. His mind has not been impressed with the deep and lasting sensation, which follows the contemplation of a work of true art. That mere imitation is not the object of the artist is proved even more conclusively by sculpture than by painting. A statue can never be made to

represent a living original in a purely mechanical way. When this is attempted, as in the images of the saints which fill the churches in Naples and Spain, the effect is revolting. Of imitation there must be a little, but very little, being limited to the relation and mutual dependence of the several parts; in other words, if the limbs be of a certain size, the body must be in proportion; the angles which are observed in the living model must be reproduced in the copy.

In a true work of art the essential character of the subject is brought into prominence; that which would conceal it being left on one side, and that which would alter it being modified or suppressed. What nature has made dominant the artist must make predominant. We have seen then the part played by imitation, and we have distinguished between literal and intelligent imitation; we have seen that what must be reproduced is the relation of parts; and finally we have found that these must be studied with a view to the bringing into prominence of an essential characteristic. From these things we get the following definition: "The end of a work of art is to bring into relief some striking or essential characteristic, more completely and clearly than is done in real objects. This characteristic in the mind of the artist is an ideal. The effect is accomplished by employing a group of linked parts, the relations of which are systematically modified. In the imitative arts — sculpture, painting and poetry — these wholly correspond to real objects." And just here it may be said that art is by no means restricted to subjects of rare and unfrequent occurence, but finds its vocation equally wherever women are patient and men are strong; wherever hearts are gladdened by the bursting of springtime buds, or feel the gloom of a winter's night. Wherever true lives are led, whether in joy or sorrow, there is the need of, and the capability of, art; for art is after all but the gathering up of the threads of meaning, that lie hid in commonplace as well as in heroic occurrences, and their expression in an abiding form.

There are some pretty traditions connected with the origin

of the arts. Portrait painting, *e. g.*, was fabled as having come from a Grecian maid imitating, or tracing on the wall, the shadow of her sleeping lover—rather a charming idea. Music was said to have been suggested by the notes made by the striking of hammers on the anvil; or again by the sounds made by the wind among the reeds on the banks of the Nile. Architecture was thought to have been suggested by groves of trees and arched caves; but such fables, although they have a poetic interest, are of no scientific value.

Let us then gather up results. The two senses, which are almost exclusively the medium of art, are seeing and hearing. The sense of seeing makes possible the arts of painting, sculpture, architecture, costume and gardening. Hearing gives us music, eloquence. It was also requisite to the origin of poetry, but may now be considered as a non-essential. Hearing and sight are combined in dramatic acting, which thus embraces all the arts.

The emotions and passions give life to the perceptions of the senses and the intellect by selection, and combination forms them into ideas. These ideas embodied in some permanent form, as painting, music or poetry, become creations or works of art. Ruskin was quoted to the effect that "the fine arts demand the exercise of the full faculties of the heart and intellect." It became evident in consequence that, although the materials of art are provided for it, the chief part is played by the mind. In a word, art has its origin in the soul. Imitation is not the highest mode of art, although it has its own province. Things must have an existence or there could be no art, because no materials for it. They must also exist in a certain way. A river must have banks, a tree has trunk and branches. These certain ways are the laws of their being. Take away the banks and you have no river. These conditions or laws must be observed in the creations of art. They must be copied, or imitated. Beyond these limitations, however, art has free scope and its resources are inexhaustible; its field is limitless. We saw that the creation of a work of art, and the appreciation of it, will be deter-

mined in kind and character by the character of the artist, and of him who is in presence of it.

It is intensely interesting to trace the development of art through all its stages. We have in its history a distinct revelation. We behold the dawn of spiritual ideas, and are made conscious of the gathering and growing light, as the ages roll on. It is pathetic to look on the first efforts of our race to image forth their higher aspirations.

> All tend upwardly though weak,
> Like plants in mines that never saw the sun,
> But dream of him, and guess where he may be,
> And do their best to climb and get to him.

In this great country art has not as yet fully realized herself. The nation is too young. The elements still need fusing. The nation must become self-conscious. Perhaps it requires more history. The very vastness of its territory, and its limitless resources, render art difficult. Fitly, as yet, invention occupies men's minds. The acquisition of wealth is a main ambition. Utility always precedes art. But the love of culture is steadily manifesting itself. Music and the drama have in this land already their most enthusiastic patrons and admirers. Architecture, sculpture, painting and poetry have made wonderful advances. It is predicted that on the shores of our lakes and in the valley of the Mississippi, art is to find her most splendid home and give birth to her noblest creations. If the fusion of cultured races, and the ampler ether, the diviner air of freedom; if the release from carking cares and narrowing wants; if the experience of all the ages without the penalty of custom which rests on old and waning nationalities "heavy as frost, as deep almost as life," if these avail anything (and what do they not avail!) then art which had its dawn in the East will in the West discover its perfect day.

CHAPTER XXII.

MUSIC — PAINTING — SCULPTURE.

MUSIC is a combination or succession of sounds having the property of *pitch.* Most people are conscious of the pleasurable sensations produced thus, although occasionally an individual is to be met, with "no music in his soul." When "married to immortal verse" this art becomes one of the very highest mediums for the expression and evocation of passion and sentiment. A succession or progression of musical sounds constitutes *melody,* whilst two or more musical sounds, heard simultaneously, whose relative pitch is properly proportioned, constitute a *chord,* and a succession of chords produce *harmony.* Italy is the land of melody; Germany that of harmony. Practically all our well known melodies are traceable to the one country, and all our harmonies to the other. Music is produced by the human voice, and by a great variety of instruments. Musical instruments are divisible into three classes. *Stringed instruments* are of various kinds. In some, such as the pianoforte, sounds are produced by striking the strings by keys; in others, as the harp, guitar and mandolin, by drawing the strings from a position of rest; and still in others, as the violin, by causing them to vibrate with a bow. The second great class comprises *wind instruments,* in which the sound is produced by the agitation of an enclosed column of air, allowed to escape at different intervals. The flute, clarionet, oboe, bassoon, hautboy —constructed of wood—are played by the breath, as are metal instruments such as the trumpets, cornet-a-piston, horn, etc.

In the case of the hārmonium and concertina, the sound is produced by the action of wind on free vibrating springs or reeds. *Instruments of percussion* are such as drums, cymbals, etc.

Some sort of music seems to have existed from the earliest times, and even savage tribes have invariably been found to possess something answering to what appears to be a universal need. An exception indeed may perhaps be found in a certain African tribe who, Livingstone relates, went into convulsions of laughter, when a hymn was sung. They, however, may have had their own ideas as to what constitutes music. We read of Moses' song and Miriam's timbrel. Representations of musical instruments are found on Egyptian obelisks and tombs. The Chinese have very ancient instruments; one resembling the Celtic harp. The lyrical poetry of the Greeks attained its marvelous perfection owing to the intimate relation between poetry and music. The Thebean Pindar (552 B.C.) was courted by kings and princes, and employed by different states to compose choral songs for special occasions, especially the public games. The Romans had both stringed and wind instruments.

The music of modern Furope is, however, a new art. Like other Christian art it originated with the Church. St. Ambrose and Gregory the Great improved the *chorale,* which was at first sung in octaves and unisons. To Guido of Arezzo is due notation by lines and spaces. Franco of Cologne, in the 13th century, indicated the duration of notes by diversity of form. The invention of the organ greatly stimulated the development of harmony. The airs which have become national are the result of a secular music, which asserted an independent existence, and had its chief seat in Belgic Gaul. In the 15th century Josquin Deprés, in Flanders, began the reconciliation of musical science with musical art. The renaissance of art and the Reformation witnessed the birth of the opera, which added greatly to the domain of music. Instrumental music made gigantic strides. "Corelli's compositions exalted the violin. Lulli and Rameau, with their ballet-like music, seized the characteristics of the

French taste, till the German Glück drove them out of the field. The scientific and majestic *fugue* reached its highest perfection under J. S. Bach. The changes introduced in ecclesiastical music in England at the Restoration, produced the school of Purcell; and a little later England adopted the German Handel, who was the precursor of Haydn, Mozart, Beethoven, Sphor and Mendelssohn." The most remarkable development of the opera in recent years has been the Wagnerian. Without attempting to characterize "the music of the future" it may be said that Wagner holds that its subject ought to be either mythological or *supernatural.*

DISTINGUISHED COMPOSERS.

G. Palestrina (1514-1594) effected a complete revolution in musical compositions for the church.

Peri in 1594 composed the first opera, which he named *Dafre.* The words were by the poet, Rinuccini.

Claudio Monteverde (1566-1650) gave a pronounced form to the opera.

Emilio del Cavaliere, in 1600, composed the first oratorio, *L'animo e corps.* It was performed at a church in Rome.

Guicomo Carissimi (1580-1673) greatly improved the oratorio. His chief works were *Jephtha* and *Jonah.*

The German, as a distinctive school, grew up with the great Protestant movement under *Luther* (1483-1546.)

Henry Purcell (1658-1695) styled "England's greatest musical genius" composed many operas. One of the finest, *The Tempest,* has words composed by the poet Dryden. He also composed 12 sonatas for the violin. He died at the age of 37.

Johann Sebastian Bach (1685-1750) composed much exquisite music of varied kinds. Almost the last of his works was his *Art of Fugue,* written shortly before his blindness.

George Frederick Handel (1685-1759). The masterpiece of this eminent and prolific genius is his oratorio, *The Messiah,* composed 1741. His is the well known "Harmonious Blacksmith."

I. P. Rameau (1683-1764). French opera.

Ch. W. Glück (1714-1787). His *Orfeo* was performed at Vienna in 1764 on the occasion of the marriage of Joseph II. He has the distinction of rising completely above the Italian opera of his time.

Joseph Haydn (1732-1809). Delightfully graceful and gentle in his music, he produced a marvelously great quantity of work.—Symphonies 118, sonatas 44, operas 19, masses 15, concertos 24, quartets 83, trios 24, dances 400, other compositions 163, total 890. His *chef d'œuvre* is his oratorio, *The Creation.*

W. A. Mozart (1756-1791) endowed the orchestra with an individual voice. He produced *Le Nozze de Figaro* in 1787, and *Don Giovanni* in 1788. He expanded Handel's Messiah. Distinguished as a contrapuntist. His *Requiem* was written for the greater part on his death-bed.

M. L. Cherubine (1760-1842). Native of Florence. Best opera, *Les Deux Jourées.* Composed chiefly church music. He wrote masses, many of them grand and impressive compositions. Beethoven pronounced him "the most estimable of living musicians."

Ludwig Van Beethoven (1770-1827). The greatest among German composers. Mozart, on hearing him improvize on a given theme, said to his friends, "take care of his youth, and he will one day astonish the world." He studied under Haydn, but they did not draw to each other, Haydn's temperament was mild and equable; Beethoven's enthusiastic and eccentric. He commenced his public career in 1795. His only opera, *Leonora,* was not a success. He was not prolific in church music. He composed, however, a great variety of music, but he is best known in his solo sonatas for the piano, of which there are thirty-five. As a *virtuoso* on the piano, he outstripped all his contemporaries, including the celebrated Hummel. In his later years he was stone-deaf and was haunted by an unreasonable dread of poverty. He died at Vienna, and was buried with great pomp.

J. N. Hummel (1778-1837). Schlüter says of him, "after the three great masters Hummel is the best pianoforte (not sonata) composer." His masses take a high rank even now.

Ludwig Sphor (1784-1859). His two greatest operas are *Faust* (eclipsed by Gounod) and *Jessonda.* Oratorios, *The Last Judgment,* and *Calvary.* His symphonies are admirable but extremely difficult. His two great violin concertos are frequently selected by modern *virtuosi* for the display of skill on the most difficult of instruments.

Karl Maria Von Weber (1786-1826). Taught by Haydn. His opera *Der Frieschütz* opened a brilliant career for him. His *Euryanthe* was produced in 1823, and his *Oberon* was first performed at Covent Garden Theater under his own baton.

Schubert (1797-1828.) *Meyerbeer* (1794-1864). *Mendelsshon* (1809-1847). *Schumann* (1810-1849). *Chopin* (1810-1849). *Rossini* (1792-1868). *Bishop* (1782-1855). *Balfe* (1808-1870). *Bennet* (1816-1875).

Charles Gounod, born 1818, stands at the head of composers of the present day. *Faust* is his *chef d'œuvre.*

Guiseppe Verdi, born 1814. Excelled all the Italian school in opera. Among his numerous and popular operas are *Ernani, Il Trovatore, La Traviata, Rigoletto, Un Ballo in Maschera Aïda.*

Richard Wagner, born 1813. He has endeavored to revolutionize the whole system of opera, and to overturn all previous notions of musical form. His *Rienzi* is formed on old models. His best known operas are, *Tanhäuser, Lohengrin, Tristan and Isolde, Meistersinger,* and *Der Ring den Nibelungenlied.*

Franz Liszt (1811-1886).

MUSICAL SCHOOLS.

In this matter there is great confusion. Some divide composers into Belgian, Flemish, Roman, Venetian, Neapolitan, Spanish, German, French and English. There are writers who group composers by their nationality and others who arrange them according to their style of composition. Some would make

two broad schools, Italian and German, whilst others would add a French and an English school. Others again deny altogether the existence of an English school. One must use his own judgment as to what arrangement to adopt if he does not feel equal to originating a classification for himself.

PAINTING.

Painting as a fine art is a subject so extensive that its treatment in these pages cannot possibly be more than the merest sketch. The art is, undoubtedly, very ancient, although not so old as architecture or sculpture. We know that the Assyrians practiced it, the beginning of whose power takes us back to the 13th century B.C. Painting and sculpture were forbidden among the Jews. No works by Greek painters are extant, but we can form some idea of the excellence they attained from the descriptions of classic writers. A curious story is told of one of their greatest artists, Zeuxis, that he died of laughing at the life-like portrait of an old woman which he had painted. With the Etruscans painting was a favorite art, and the importance of their wall-paintings in the history of the classic art is considered very great. Antique painting is known to us from wall-paintings, many of them frescoes, at Herculaneum, Pompeii, Stabiæ, and in Rome and its vicinity.

Early Christian art had, for a long time, no vigorous life of its own, and, with the decline of Roman art, it declined. In the 13th century it revived. This was the period of the rise of the mendicant orders, which mark a new era in religious thought, and also in religious art. St. Francis of Assisi was the moving spirit, and in the Academy of Florence there are paintings of that time representing scenes from the life of Francis, and others portraying passages from the life of Christ, the one set being typically connected with the other. The two great art centers during the 14th century were Florence and Siena. The early renaissance of painting in the 15th century was inaugurated by Masaccio, whose masterpieces are now in Florence. In North Italy the most important school was the Paduan, at the

head of which was Mantegna (1431–1506). There was also the Venetian school. The renaissance of Italian painting embraces that period when "exact imitation first gave place to creative beauty." *Leonardo da Vinci* (1452–1519), was an architect, sculptor, painter, musician, engineer, and an improvisatore. He excelled in expression, and was great as a portrait painter. *Michael Angelo*, great in sculpture, and in architecture, was not less great in painting. He belongs to this period. *Raphael Tanzio* (1483-1520); as also *Genulio Romano* (1492-1546); *Andrea del Sarto* (1486–1530); *Coreggio* (1494–1534). Famous Venetians were *Sebastian* (1485–1547); *Titian* (1477–1573). *Hubert* (1366–1426) and *Jahn Van Eyck* (1370–1441) were the founders of the Flemish school. *Rubens* (1577–1640) was the leader of the Flemish revival, "a consummate painter, an enlightened scholar, a skillful diplomatist, and an accomplished man of the world." He was one of the most brilliant men of genius the world has ever seen. His well-known picture, "Christ crucified between the two thieves" is in Antwerp Cathedral. *Sir Anthony Van Dyck* (1599–1641) a native of Antwerp; second only to Titian as a portrait painter. *Sir Peter Lely* (1617–1680), *Rembrandt* (1606–1674). *Albert Dürer* (1471–1528) founder of the German school. Longfellow sings of him:

> "Hence in silence and in sorrow, toiling still with busy hand,
> Like an emigrant he wandered, seeking for the Better Land.
> *Emigravit* is the inscription on the tombstone where he lies;
> Dead he is not, but departed,—for the artist never dies."

Holbein (1499–1554). In the 17th century Spain produced two great artists, *Velasquez* (1599–1660) and *Murillo* (1618–1685). France affords us the names of *Nicholas Poussin* (1594–1665) and *Claude Lorraine* (1600–1682).

Nearly all early English painters were portrait painters. *Sir Godfrey Kneller* (1648–1723) *William Hogarth* (1697–1764) "was to English art what Charles Dickens was to English literature." *Sir Joshua Reynolds* (1723–1792), *Gainsborough* (1727–1788). *Benjamin West* (1738–1820) was born at Springfield,

Penn. He is said to have taken his first lessons in painting from the Cherokee Indians. He was assisted to go to Italy, and made rapid progress in his studies at Rome. An American, studying art, was considered something marvelous. Upon seeing the Apollo Belvidere he is said to have exclaimed, "A young Mohawk warrior!" to the horror of the bystanders. "West inaugurated a new era in historical painting by delineating his characters without the conventional Greek or Roman costume." He lived in London and succeeded Sir Joshua Reynolds as president of the Royal Academy. *John Singleton Copley* (1737–1815), also an American, who settled in England. *Allan Ramsay* (1709–1784), *John Opie* (1761–1807), *William Blake* (1757-1828), poet and artist, *Thomas Bewick* (1753–1828), *Henry Raeburn* (1756–1823), born in Scotland. *Sir Thomas Lawrence* (1769–1830), *David Wilkie* (1785–1841), *George Cruikshanks* (1792–1878), best known by his illustrations of Dickens and his temperance prints; *Joseph W. W. Turner* (1775–1851), whose genius Ruskin brought to the front; *Edwin H Landseer* (1802–1873), an eminent English animal painter.

Among important American artists are the following: *Gilbert Stuart*, born in Narragansett, R. I., 1755; died in Boston, 1828. He painted a series of national portraits, which will forever endear him to the patriotic American. His renderings of Washington are celebrated. What is known as the "Athenæum head" at Boston, with its pendant, the portrait of Mrs. Washington, is the most famous. *John Trumbull* (1756–1843), an historic painter. *Charles Wilson Peale* (1741–1827), a portrait painter. He painted fourteen portraits of Washington. *Joseph Wright* (1756–1793), *E. Savage* (1761–1817), *William Dunlap* (1766–1839), *John Blake White* (1782–1859), a native of Charleston, S. C., painted historical pictures. *Washington Alston* (1779–1843), painted scripture history, portraiture, ideal heads, *genre*, landscape and marine. *John Vanderlyn* (1776–1852), is best known by his *Marius on the Ruins of Carthage*, for which he received a medal at the Paris Salon in 1808; and his *Ariadne*

which forms part of the collection of the Pennsylvania Academy. *Samuel F. B. Morse* (1791–1872), whose fame in connection with the electric telegraph has eclipsed that which he merits as an artist. *Dr. Rimmer* (1816–1879), of English parentage, began life as a physician. *William Sydney Mount* (1807–1868), the son of a farmer on Long Island. "No other artist has rivaled Mount in the delineation of the life of the American farmer and his negro field hands, always looked at from the humorous side." *Henry Inman* (1801–1846) an excellent portrait painter. The Indian tribes have been the subjects of *George Catlin* (1796–1872) and *C. F. Wimor* (1829–1863). *John James Audubon* (1780–1851) the eminent naturalist, distinguished as an ornithological painter. *William J. Hays* (1830–1875) selected for his province the animal world of the prairies and the West. A large picture of his is in the Museum of Natural History of New York, the subject being an American Bison. *Thomas Cole* (1801–1848) takes the first place in the early history of landscape in the United States. His picture, *The Tornado,* is in the Corcoran gallery at Washington. *I. F. Kensett* (1818–1873) and *Sandford R. Gifford* (1823–1880) are prominent in the "Hudson River School." *John W. Hill* (died 1879), is one of the first among the little band of American pre-Raphaelites. Among marine painters *James Hamilton* (1819–1878), who was brought to this country from Ireland in his infancy, stands highest. *William Morris Hunt* (1824–1879) studied in Europe and, amongst others, under Millet, the famous peasant painter. His most famous works are the original sketch for the *Flight of Night,* several portraits, and a *View of Gloucester Harbor.* *R. H. Fuller,* of Boston, "who died comparatively young in 1871 had a most extraordinary career, and displayed extraordinary talent. Originally a cigarmaker, and later a night-watchman, he was almost entirely self taught, his studies consisting in carefully looking at the French landscapes on view at the stores, and then attempting to reproduce them at home. The knowledge thus gained he applied to the rendering of American landscapes,

and he had so assimilated the methods of his French exemplars that his creations, while they often betrayed by what master they had been inspired, were yet thoroughly American."

Some American artists of the day are *William H. Beard,* who was born in Painesville, Ohio, in 1825. He is to a great extent self-taught. He is a member of the National Academy, and is best known for his rendering of animal life. *Alfred T. Bellows* was born at Milford, Mass., and began life in an architect's office. He abandoned his profession at the age of 21, and studied several years at the Royal Academy of Antwerp. Mr. Bellows is one of the most successful water-color painters of the age. *Robert Swain Gifford* is a landscape and marine painter. He was born about half a century ago at Naushau, an island in Buzzard's Bay, Mass. *William M. Chase* is a native of the state of Indiana. He studied at Munich, the capital of Bavaria. *John J. Enneking* was born in Minster, Ohio, in 1841; is the son of a farmer of German descent. He fought in the civil war. He paints landscape, and has been successful in drawing and painting the figure from living models. His residence is at the village of Hyde Park, near Boston. *Thomas H. Wood* saw the light at Montpelier, Vermont. He is a successful *genre* artist. *Genre* is a word borrowed from the French, and means *people.* The term is applied in art to simple domestic scenes, including one or more figures suggested by every-day life, as distinguished from elaborate pictures of fashionable life or of history. *Samuel Colman* was born in Portland, Maine. In 1866, having previously been made an academician, he was elected president of the American Water Color Society. One of his most successful works is a painting of Gibraltar. *Wordsworth Thomson* hails from Maryland. He has shown originality and strength in historical compositions, and fairly earned a place beside Trumbull. *David Neal* was born in Lowell, Mass., in 1838. He is best known by his painting, "The First Meeting of Mary Stuart and Rizzio." He has established his reputation in Europe as well as in this country. He resides at Munich, Bavaria, with his family.

Sculpture is the art of expressing ideas or images in solid material. It was practiced by all the great nations of antiquity, and in Greece attained a perfection which has never been surpassed. Even the Moses of Michael Angelo is a Grecian god, and the Greek slave a copy of an ancient Venus. India and Mexico in remote ages were great in sculpture. The earliest names of sculptors are furnished by the Old Testament. Assyria and Egypt are full of relics to show how early this art was cultivated. It was not carried to perfection as early, probably, as architecture; but rude images of gods, carved in wood, are as old as the history of idolatry.

After the year 600 B.C., schools of sculpture grew rapidly at Corinth, Egina, Sicyon (Greece). The Egina marbles were discovered in 1812. They are now at Munich, Bavaria, and there are casts in the British Museum. Beauty was adored in Greece, and every means was taken to perfect it, especially in form, which is the characteristic excellence of Grecian statuary. Phidias, born 484 B.C., stands at the head of ancient sculptors. He had intrusted to him the adornment of the Parthenon, and his great statue of Minerva cost alone $500,000. His, too, was the statue of Jupiter in the temple at Olympia, which was forty feet high on a pedestal of twenty feet. The god was seated on a throne, composed of ebony, gold, ivory and precious stones. Praxiteles wrought in bronze and marble. He was one of the artists who adorned the mausoleum of Artemisia. His most famous work was an undraped statue of Venus, to see which, people flocked from all parts of Greece. The "Venus de Medici" is conjectured to be a copy from him. He is said to have been the first to represent the female figure quite nude. Scopas was the author of the famous "Niobe group," now at Florence; Agasias, of the "Fighting Gladiator;" Chares, of the "Colossus at Rhodes;" Athenadorus, of the "Laocöon;" Glycon, of the "Farnese Hercules." The Grecian artists also carved animals with accuracy and beauty. Nicias was famous for his dogs; Myron, for his cows, and Lysippus, for his horses. Praxi-

teles composed his celebrated lion after a living animal. Regarding the Elgin Marbles, the great authority Flaxman says, "The horses of the frieze seem to live and move; to roll their eyes, to gallop, prance, and curvet; the veins of their faces and legs seem distended with circulation. The beholder is charmed with the deer-like lightness and elegance of their make; and although the relief is not above an inch from the back ground, and they are so much smaller than nature, we can scarcely suffer nature to persuade us they are not alive." The Greeks also carved gems, cameos, medals, and vases, and the few that have come down to us display great beauty, both in design and execution.

The Romans did not create a school of sculpture. But, although they imitated the Greeks, their work was of the highest kind, especially in the time of Hadrian. The busts of the emperors were in every city, and Rome was filled with statues. Even in the sixth century, after Rome had been sacked and plundered by the Goths, a traveler gives this description of it. He says there were eighty golden statues of the gods; eighty large ivory statues of the gods; 1,797 palaces; 1,352 fountains; 3,785 bronze statues of emperors and generals; twenty-two great horses in bronze; two colossi; two spiral columns; thirty-one theaters; eleven amphitheaters; 9,026 baths. There was a long period during which art slumbered, and, indeed, might be said to be dead; but it began to revive as early as the tenth century, and the sixteenth century gave birth to Michael Angelo, a name almost as familiar as that of Shakespeare. Cibber, who sculptured in England, was a Dane; Thorwaldsen, a native of Iceland; Canova, an Italian. Flaxman's finest work was the *Wellington Shield*, after the Homeric description of Achilles. Much fine sculpture has come down to us, some of which has been referred to. The museum of the Vatican at Rome alone, contains several thousands of specimens. Among them are antique copies of the *Cupid and Fawn* of Praxiteles, the statue of Demosthenes, the *Minerva Medici*, *The Athlete* of Lysippus, the *Torso Belvidere* of Appolonius, the *Belvidere Antinous*, the *Laocoön*, the *Apollo Belvidere*, the *Sleepy Ariadne*.

Michael Angelo (1474-1563) opened up an undreamt of future for his favorite art of sculpture. The work which first showed the true impress of his genius was his colossal marble statue of David, completed in 1501. His colossal statue of Moses, designed for the mausoleum of Pope Julius II. is a masterpiece, and his monuments to the Medicis in St. Lorenzo at Florence are always quoted amongst his greatest achievements. Nuremburg was the Florence of German sculpture. *Michael Wolgemuth* (1434-1519) and *Albert Dürer* (1471-1528), both eminent painters, were skilled in wood-carving. Sculpture developed later their wood-carving, but in the same direction. The greatest master of stone sculpture in Germany was *Adam Krafft* (1430-1507), a native of Nuremburg. Prior to the revolution, excepting in the carving of figureheads, sculpture was unknown in the United States. In 1816 John Trumbull said to Frazee: "Sculpture would not be wanted here for a hundred years." In 1824, however, the first portrait in marble was executed by *John Frazee*, a stone-cutter. In 1805 *Hiram Powers* was born, one of the best known sculptors of the century, and in the same year *Horatio Greenough*; *Hart*, 1810; *Clevenger*, 1812; *Crawford*, 1813; *Mills*, 1815; all sculptors of note, and important as pioneers in art. Powers and Crawford, without the advantages of those living amid the wealth of art of all the ages, yet succeeded in gaining a European renown. Powers was a farmer's boy of the Green Mountains. His *Greek Slave, Penseroso, Fisher Boy,* and *Proserpine,* are amongst his most successful achievements. James Hart, who died at Florence in 1879, was born in Kentucky at the beginning of the century. His education was confined to three months at the district school. *Angelina* and *Woman's Triumph* are two of his prominent works. Clevenger was an Ohio stonecutter. *Thomas Crawford*, a native of New York, has genius. His art is at once grand and sympathetic. Among his most important efforts are the equestrian statue of Washington at Richmond, and the colossal statue of Beethoven in the Music Hall at Boston. He executed the bronze door of the capitol at

Washington, and his is the graceful statue of "Liberty" on its dome. *Clark Mills* produced the equestrian statue of General Jackson opposite the White House, and that of General Washington, for which he received $50,000. He is remarkable for dexterity and talent rather than for genius.

Henry K. Browne, one of our earliest sculptors, executed the equestrian statue of Washington, in Union Square, New York, and that of General Scott at Washington. *Thomas Ball,* originally a portrait painter, has done good work. His equestrian statue of Washington, in the Public Garden at Boston, is one of the finest in the country. *I. Q. A. Ward's* colossal bronze statue (equestrian) of General Thomas, marks him out as one of the most vigorous and individual sculptors of the age. His bronze statue of Washington at Newburyport is one of the most valuable productions in American sculpture. *Benjamin Paul Akers,* of Portland, died before attaining the maturity of his powers. His "Pearl Diver" and "St. Elizabeth" are exquisite works of art. The former and also his ideal bust of Milton are described by Hawthorne in the "Marble Faun." In that romance the young sculptor Kenyon is Akers. *Edward S. Bartholomew* of Connecticut died at the age of 36. *Eve Repentant, Ganymede,* and *Hagar and Ishmael* live to tell what he was, and to indicate what he might have become. *Larken J. Meade* is the sculptor of the monument to Abraham Lincoln at Springfield, Ill. It is of colossal dimensions and cost nearly $300,000. In size and importance it ranks next to the magnificent monument at Plymouth designed by *Hammatt Billings.*

Franklin Simmons designed the monument to the army and navy at Washington. One of his best works is the statue of Roger Williams. *William W. Story* was originally a lawyer. Having ample means he devoted himself to poetry, the drama, and general literature, and has succeeded in sculpture to a degree which has caused a leading London journal to call him the first sculptor of the Anglo-Saxon race since the death of Gibson.

Miss Hosmer has achieved a fame scarcely less than that of

Story. Her best known works are "Puck," "The Sleeping Sentinel," "The Sleeping Faun," and "Zenobia." *Erastus D. Palmer* has won transatlantic fame by the purity and originality of his art. The son of a farmer, he was a carpenter until the age of 30, when he followed the bent of his genius. *Launt Thomson* was a poor lad, who became assistant to Palmer and acquired supreme skill in modelling. His chef d'œuvres are "Napoleon," "Edwin Booth," "General Sedgwick" at West Point, "President Pierson" at Yale College.

John Rogers is more widely known throughout the country than any of our sculptors by his numerous statuette groups in clay. Other notable American sculptors are *Daniel C. French, W. R. O'Donovan, Olin M. Warner, Howard Roberts* and *J. S. Hartley.*

CHAPTER XXIII.

ARCHITECTURE — LANDSCAPE GARDENING, ETC., ETC.

ARCHITECTURE is divisible into civil, military and naval, but as a fine art it is limited to the first. The German philosopher, Schlegel, called architecture "frozen music," which points to the fact that it contains an idea, or embodies a conception. As a fine art, it is not merely so much material symmetrically constructed. The Greek Temple, for example, embodied the conception of all pervading deity ; the Gothic cathedral shadowed forth human aspirations after a personal God. The basilicas, amphitheaters and triumphal arches of Rome sprang from a national desire for terrestrial power and material aggrandisement. Climate is an important factor in determining the architecture of a people, and, generally, it may be said that the more widely two nations differ in their characteristics and circumstances, the greater will be the divergence in the main features of their architecture. Thus, again, the more definite, deep and comprehensive the thought to be expressed, the greater will be the richness, variety and precision of the expression.

Different styles of architecture have been the result of national ideas and aspirations, and it is on this account that a mixture or compound of styles in a building, such as, say the Greek, Gothic and Egyptian, is characterless and incongruous, suggesting a medley of widely different kinds of music, or a jumble of a number of languages. Whatever claims to be the outcome of thought should be consistent and harmonious. Art

ANCIENT ARCHTECTURE.

found its first development in temples erected for the worship of God. Architecture thus was the expression of devotional feeling. In India, Egypt, Greece and Italy, the various temples originated in blended superstition and devotion. The edifice erected for religious worship reached its culminating height of beauty and grandeur, after the Crusades, in the Gothic piles of Cologne and Westminster. The architecture of Egypt produced its overwhelming effect by the vast proportion of its public buildings. There was no attempt at graceful embellishments. Its design was to awe and astonish the people. There was an idea of everlastingness about their erections. The temple must have seemed to the gazer to be

"The changeless God's eternal fane."

The Pyramids have outlasted all other monuments. The ruins of Thebes surpass all others in extent and majesty. Architecture, however, as the expression of genius and civilization, was perfected by the Greeks. The *Doric* was the favorite order of European Greece and her colonies for a thousand years. The Parthenon at Athens, and the Temple of Theseus exhibited its perfection. Nearly coeval with the Doric was the *Ionic* order, invented by the Asiatic Greeks, more graceful, but not so imposing as the Doric. The Athenian Acropolis is a perfect example of this order. The *Corinthian* excels the Doric and Ionic in refinement and elegance. It arose towards the end of the Peloponnesian war. Of this order the most famous temple in Greece was that of Minerva at Tegea, destroyed by fire 400 B.C. The Romans adopted the Corinthian style, which they made even more ornamental, and by the successful combination of the Etruscan arch and the Grecian column, laid the foundation of a new and original style. The Romans, however, invented no new principle in architecture, except the arch. The Gothic, or Pointed, or Christian architecture, was the creation of the middle ages. No new principle in architecture has been discovered by the modern world. The ancients are still, and will remain, our school-masters. The greatest evidence of the

matchless creative genius displayed in those architectural wonders is that, after two thousand years, and with all the inventions of Roman and modern artists, no improvement can be made, and those edifices which are the admiration of our own times, are deemed beautiful as they approximate to the ancient models, which will forever remain objects of imitation.

MARVELS OF ANCIENT ARCHITECTURE.

Temple of Carnack.—Egypt. Built of blocks of stone 70 feet in length, on a platform 1,000 feet long, and 300 wide, with pillars 60 feet high. The alley was 6,000 feet long. Alleys of colossal sphynxes form the approach.

Pyramid of Cheops.—A solid mass of stone. To build it 100,000 men worked for 40 years. It covers a square the side of which is 768 feet. Height, 452 feet.

Temple of Solomon.—Built probably by Phœnician artists. It had great splendor of decoration. It was not remarkable for greatness of size, and resembled the oldest Greek temples. The portico of the temple, in the time of Herod, was 180 feet high, and the temple itself was entered by nine gates thickly coated with silver and gold.

The Parthenon, at Athens, was built of Pentelic marble, and rested on a basis of limestone. It was 227 feet in length, 101 in breadth, 65 feet in height, surrounded with 48 fluted columns. It was adorned with the choicest sculptures of Phidias, the grandest of which was a colossal statue of Minerva, 40 feet in height, and composed of gold and ivory. The inner walls were decorated with paintings. The Parthenon, the most beautiful specimen of the Doric, has never been equaled. It still stands in ruins.

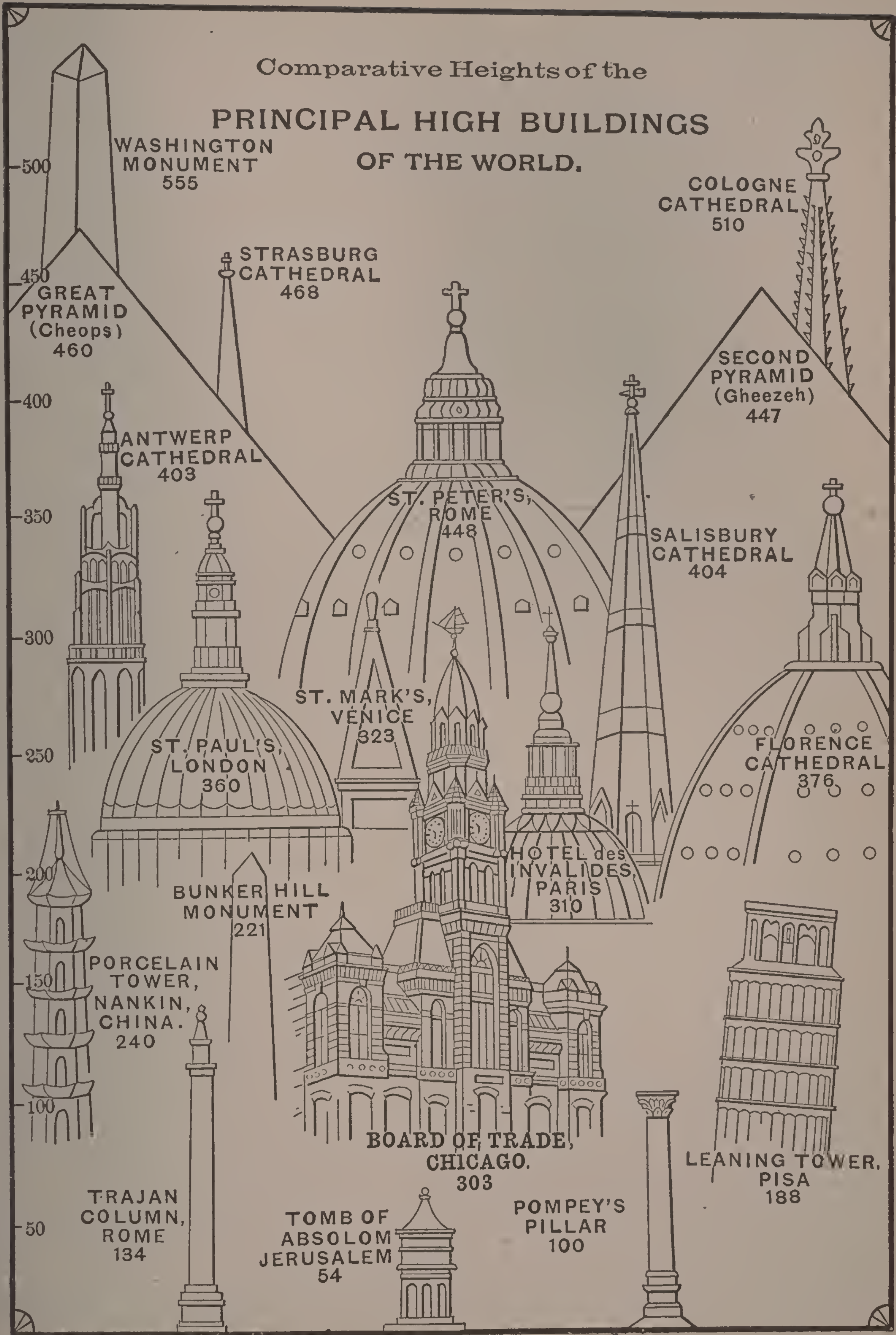
The Acropolis, at Athens, is a perfect example of the Ionic order.

Temple of Diana, at Ephesus. One of the seven wonders of the world.

The Pantheon, Rome. The columns are 42 feet high, each hewn out of a single block of Eastern marble. In 27, B.C.,

Comparative Heights of the

PRINCIPAL HIGH BUILDINGS OF THE WORLD.



after the battle of Actium, it was dedicated to *all the gods;* hence the name *Pantheon.* Statues of these in gold, silver and bronze were placed in it.

Arch of Septimus Severus, Rome, erected 203 A.D. The "Arc du Carrousel," Paris, is a copy of this.

The Colosseum, Rome, covered 65,000 square feet. Its arena, which was oval, measured in length 260 feet, and width 150.

Trajan's Column, Rome, was entirely revealed in 1813. Its shaft is encircled by an endless scroll from the bottom to the top, on which are sculptured 2,500 figures of soldiers, prisoners, horses, elephants, weapons and war material. A statue of the conqueror crowns the column.

The Church of St. Sophia, Constantinople, was built by Constantine; burnt 532 A.D.; rebuilt by Justinian, who said, referring to the temple of Jerusalem, "Solomon, I have surpassed thee." Nothing can surpass the majesty of its porticoes, in the Corinthian capitals of which, animals, allegorical figures and crosses are interlaced among the leaves.

The Alhambra, Spain. Built by the Arabs, one of the greatest architectural marvels.

Mosque of Cordova, Spain. Built by Arabs, was to them what St. Sophia was to the Byzantines, and St. Peter's to the early Christians.

Famous cathedrals on the continent of Europe are those of Amiens, Spires, Chartres, Bourges, Rheims, Milan, Maus, Strasburg. In England, Chester, Ely, Salisbury. In Scotland, St. Andrew's.

St. Peters, Rome. First stone laid, 1506. Exterior length, 712 feet. Width of great nave, 88 feet. Dome, 137 feet in interior diameter. Pillars supporting the dome 70 feet in thickness.

Westminster Abbey, London, where the dust of England's greatest warriors, statesmen, philosophers, poets, men of letters, etc., repose. A venerable and beautiful pile visited by throngs of strangers.

Gallery of Francis I. at Fontainebleau, France.

The Louvre, Paris.

Landscape Gardening is justly numbered among the fine arts. In this country, with its passionate love of flowers, its magnificent spaces, and its varied climate and soil, great progress has been made in the art of laying out grounds with an eye to the beautiful and pleasing. In the friendly rivalry between communities in this regard, Chicago may well be proud of her appelation, "The City of Gardens." Public parks and the gardens of the wealthy, connected with their residences, afford scope for the exercise and development of this fine art.

One of the most essential features to be studied in landscape-gardening is harmony of effect. The eye will often rest with instinctive pleasure on a scene, where nothing striking in figure or brilliant in color compels the attention. Everything should be proportionate with a central design, or idea, to the realizing of which the parts should be subordinated, as in the painting of an artist. The surroundings should be carefully studied so that they may add to the general effect. Contrast may be very successfully employed. In a prairie country, for example, terraces and mounds might be introduced with a pleasing result. Where the natural scenery around is tame, a certain irregularity of design attracts and relieves the eye, especially when the Horatian dictum, "*ars celare artem*"—the art of concealing art—is observed. Water in the artificial lake or cascade, is seldom introduced with success; but the fountain, with its splashing drops, often lends an additional charm. A very great deal may be done in the arranging of trees and shrubs.

The landscape-gardener of olden times revelled in the trim porterre, with its geometric forms, close-clipped hedges, terraces, mounds, artificial lakes, streams and hills. The *topiarian* art, which dates back to the Augustan age of Rome, or shortly before the beginning of the Christian era, delighted in clipping out trees and shrubs into fantastic shapes, such as the figures of animals, vases and the like, but modern landscape-gardening discards all this. Like the other fine arts, its tendency now is rather towards the natural and realistic. In Europe gardens may still be met with

where the *topiarius* or *pleacher* has held sway, with beds laid out like mosaic, reminding one of the samplers of our great-grand-mothers.

The *geometric* style is that in which regular forms prevail; and the opposite, from having been originated and first extensively practiced in England, is known as the *English*. On the continent of Europe, a pleasure-ground laid out with winding and irregular walks and scattered trees, or groups of trees and shrubs, is called an *Englsh Garden*. In addition to floral effects, very beautiful harmonies are now produced by the artistic combination of ornamental leaf-plants of graduated shades. Many of these belong to the nettle tribe and are the result of scientfic cultivation.

COSTUME — THE ART OF DRESSING.

That the art of dressing should be considered a fine art may, to some people, seem extraordinary. The philosopher Carlyle had the idea that the best way to end the difficult question of clothes would be that people should go about in suits of leather. No doubt his plan, if adopted, would answer some purposes of dress; but, rightly or wrongly, for any length of time, human beings have passed the mere purpose of keeping themselves free from cold, or serving by garments any primitive purpose of covering. Just as the mere rude hut, or building, passed into the temple, so the skin or blanket of the savage became shaped and colored, with a view, perhaps, rather to the setting off of the charms or proportions of the wearer, than with, at least, a chief regard to mere comfort or utility. So, obviously, costume emerged from the ranks of the practical arts, and took its stand alongside of architecture, sculpture, painting and music, as a fine art.

In the absence of manufactured articles, savage tribes in all countries are, and have been, in the habit of attiring themselves in such rude materials as nature has placed within their reach. The Indian, with whom we are more or less acquainted, clothed himself in skins on which the fur was left, or in a blanket procured

in trade. His legs and feet he dressed in moccasins; but even he attempted to adorn himself with paint and feathers. In some of the islands of the Pacific, as also till lately in New Zealand, the inhabitants *tattoo* the surface of the body by puncturing it with an instrument, and inserting colored juices in the wound. Such, also, was the practice and fashion of the original inhabitants of the British Islands. To almost all fashions in the personal adornment of the body the old Latin saying is peculiarly applicable, *de gustibus non est disputandum*, "There is no good disputing about tastes." Perhaps it may be well to say that men mostly desire by their dress to make themselves more distinguished; women, on the other hand, wish to become more lovely and therefore attractive.

Climate has, of course, a great deal to do both with the color and form of dress. Throughout Asia, in North Africa, and in Turkey, the dress is generally of a loose and flowing form. The more sunshine there is in the air, the brighter the colors in dress seem to grow; at the same time *white*, for easily understood reasons, is always common in warmer countries. The *turban* of the Turk may seem to us at first sight a cumbrous and unsightly head-dress, but yet there is reason in it. The folds protect the head from the rays of the sun.

The dress of the modern Greek is a mixture of Eastern and European costumes, with little to mark the classical origin of the people. The chief article of attire of the poorer Greek is a *capote*, or large woolen garment with a hood, shaggy, with short threads of yarn; it is heavy when dry, but nearly insupportable when wet; it is serviceable for home and bed to the wandering Greek as the *bunda* is to the Hungarian shepherd, and it is a perfect defense against cold and dew. All but the poor classes of Greek, however, dress showily, and even a servant will spend every farthing of his wages on fine clothes. We know better than that, and think rather of our character than our clothes. The unenlightened Greeks! The young Greeks are the handsomest race in Europe; their long hair falls over their shoulders

from under the cap; their embroidered jackets, vests and buskins; their arms mounted with silver, and even jewels, and their white kilts, compose, on the whole, one of the most graceful and becoming costumes in the world. The costume of the Greek female more closely resembles that of the Turks. She wears loose trousers of fine calico, embroidered with flowers, a closely fitting vest, a jeweled zone about the waist, and a long-sleeved gown, flowing off loosely behind, or a veil covering the body; and sometimes a rich pelisse trimmed with fur. The young women often dye their hair auburn, and the old ladies red, with which color the nails are also tinged. The females walk abroad in a robe of red or blue cloth and an ample muslin veil.

The costume of America is, after all, merely a modification of the dress of other countries and other ages. In nothing, perhaps, dare originality be displayed so little as in costumes. Not even theology is so hedged in with difficulties. Custom, in this respect, weighs upon men and women,

"Heavy as frost and deep almost as life."

This, at least, on a dangerous subject may be said, that, mainly, the dress of this country should be adapted to an active, city-dwelling, hard-working people. Some nations, concerning flowing or classical costume, are fancied rather than rational. If there be anything in "the human form divine," the less that any costume clogs and cumbers, and conceals it—consistently with decorum and comfort—the more becoming must it, in any well formed person, be.

SUMPTUARY LAWS ABOUT DRESS.

The Florentines drew up a series of sumptuary laws in 1415, directed against the luxury and splendor of women's dress and of marriage festivals. They declared that such magnificence was opposed to all republican laws and usages, and only served to enervate and corrupt the people. If a citizen of Florence wished to give an entertainment in honor of a guest, he was obliged to obtain a permit from the Priors of Liberty, for

which ne paid ten golden florins, and had also to swear that such splendor was only exhibited for the honor and glory of the city. Whoever transgressed this law was fined twenty-five golden florins. It was considered shameful to have much plate; nearly all household implements were of brass, now and then beautified by having the arms of the family in enamel upon them. These sumptuary laws were not confined to Florence. The town of Pistoja enacted similar ones in 1322; Perugia in 1333. Phillipe le Bel promulgated sumptuary laws in France in 1310; Charles the Ninth in 1575; and Louis the Thirteenth in 1614; but with no greater success than the worthy old republicans.

THE SEALSKIN JACKET.

Probably not one lady in a thousand who wears a sealskin jacket has the vaguest idea of its origin, its history, or of its original owner. Still less probably can she imagine of what wild scenes and marvelous natural phenomena that much-prized fur is the outcome. The resorts of the fur seal are now confined exclusively to the Alaskan region, and even there to the two small islands forming the Pribylov group, lying far out in the stormy Behring Sea. In former days these valuable pinnipeds were also found in teeming myriads in the Antarctic seas, but the ruthless greed and short-sighted avarice of competing nationalities have virtually extirpated the race in these waters. Nowhere else, therefore, in the wide world can a fur-loving civilization look for its supplies than to these two small islands far away in the North Pacific.

CHAPTER XXIV.

A PHILOLOGICAL RAMBLE.

IN this age of progress there have been busy and able minds working in a direction, clearing a path, as it were, down which in fancy we can all pleasantly stroll, making by-ways as we go, and, whilst we amuse and refresh ourselves, we can easily gain valuable instruction. The study of words has always had an interest for many who would not like to call themselves scholars. There is a kind of instinctive desire to know not only what a word means, but where it comes from; we want to know what a word's history has been, and what are its connections. There is a great deal of character, of individuality, about certain words, and their study becomes fascinating and profitable. Once get started and you are carried right along, enriching your collection all the way. You place your specimens in the cabinet of the mind, and can take them out and examine them just when you please. Collectors of curiosities have a story to tell in connection with each of their treasures, and so has the student of words, the story often being not only entertaining but instructive. The triumphs of philology during the present century are known to the readers of such writers as Max Müller. Science has accomplished marvels in modern times, and the science of language can boast of magnificent achievements.

That a language should be completely lost and after thousands of years the key to it be found is surely a marvelous thing. The result is modern Egyptology, with its extraordinary elucidation of

ancient history. What could be more interesting and surprising, again, than that scholars should, by means of philological research, be enabled to undo the confusion of tongues, which we associate with Babel, and take us away back through numberless centuries to the dwellers on the plains of Asia. from whom we are all alike descended, tell us how they lived, what they thought, and what they did. We used to think we needed a written history to inform us about these things and we call Herodotus the father of history. We fancied that farther back than the Bible historically takes us we could not hope to travel, but now by means of language alone, the philologist conducts us leagues farther into primeval times.

Out of the triumphs of science in this direction, an increased sense has developed itself, among the educated, of the value and even the sanctity of words. A dead language may be an appropriate enough name for one that is no longer spoken, but in the sense that history is living, containing as it does thought and experience, so is language ever. Words afford a wonderful clew to the character of those who use them. Humanity stamps its individuality upon its creations In the various arts, for example, there are inread intellectual and moral qualities. Thus we have pagan, Christian and national art. Most people use words very much as they do coppers or nickels, the only difference being that they take considerable care of the latter, and are particular as to whether they are good or bad.

That a word is a living thing and can be helped or injured they do not for a moment imagine. No one in his senses will, without occasion, give a dollar for a dime, but in the use of language what magnificent terms are constantly thrown away on the most trivial matter. Then again words are powerful things. They frequently mislead men woefully. It is a well established fact that more famous controversies have arisen from misunderstandings as to words or terms than from any other cause. Bacon says, "men often fancy they are using words when words are using them." Sometimes the employ-

ment of the polysyllabic jaw-breaker is the result of affectation or weakness, as in the case of the colored brother, and becomes amusing. Everyone has chanced on a Mrs. Partington or Malaprop. Some time ago an ancient guide conducting the writer over the castle of St. Andrew's, in Scotland, remarked: "I see that thae Americans hae procrastinated aniter storm." He meant, of course, prognosticated. A more staggering mistake was made by a gentleman who ought to have known better. It was at a sheltered watering place, with which he was greatly taken. "I'll get my father to come here for a spell," he said. "Don't you think," it was suggested, "that the climate is rather relaxing." "Oh, well," he replied, "my father has been working too hard and requires some relaxation!" He was quite in earnest.

It is very desirable, certainly, to be acquainted with foreign languages, but after all, the truest test of culture is in the use of one's own. We cannot withhold a certain feeling of respect from him or her whose conversation shows a familiarity with and nice appreciation of the choice society of words to be found in the English tongue. If we take a short ramble into the realms of words, we shall find that they are unmistakably living beings. They will speak to us, and tell us strange stories. Now we shall find a once notable character sitting, like blind Bartimæus, by the wayside begging, and another who was once a Cinderella in the kitchen, playing princess in Mayfair. There are Dick Whittingtons to chance on, Lady Clares, Cardinal Wolseys, Jack Falstaffs, Nell Gwynnes, and a thousand others, from the king on the throne to the beggar on the dunghill, from the hyssop on the wall to the cedar on Lebanon.

Royal fathers once called their daughters *wenches*, and their sons *knaves*. *Queen* meant, to begin with, simply a woman or wife. *Dunce* was a great logician in the Middle Ages. A *minister* was a servant, now he is often greater than the magistrate or the master. *Trump* and *triumph* had the same father, but have gone different ways. The one is winning a battle while

18

the other is taking a trick. Still, *trump* is a good fellow which *triumph* frequently is not. *Court* had once to do with cattle, but now associates with royalty. *Virtue* once was not much more than manly; now it would be difficult to exhaust the depths of sublimity of its character. *Solemn* meant originally, "once a year." It was applied to annual celebrations. It attained its present dignity by remembering that familiarity breeds contempt. Even earthquakes would cease to solemnize if they occurred every day. A word which has an exceedingly unfortunate history is the once beautiful charity. She was adopted from the Greek by Christianity. The word originally signified that higher affection or love which is above mere passion or appetite, and is founded on admiration and esteem. Charity was a virtue deliberately cultivated by the Greeks and formed an almost indestructible bond of the noblest affection. Damon and Pythias had charity for each other. Christianity invested the term with an intensity of meaning. The classic marble, as in the fable, breathed the breath of life. Charity became "chief among the blessed three," and according to St. Peter "covered a multitude of sins." She united in the brotherhood of Christ all to each, and each to all; put the hand of the weakest in that of the strongest. As time wore on, helpfulness, which is one characteristic of charity, came more and more strongly out.

Material helpfulness, naturally, the easiest, became emphasized. That which was bestowed out of charity came to be called charity—until the copper given to the unfortunate begger goes by the name. She who might have been portrayed as exquisitely beautiful, with the sweet light of heaven in her eyes and flowing grace in all her mien, is now degraded to the condition of a poor-house child. Who would not once have loved to be an object of charity but who would be so now: *ex uno disce multa.* Such is the abbreviated history of a word now even ejected from the Bible, and yet most people fancy that single words can teach them nothing. Cunning, wit, artifice, craft, had all once

a noble meaning. Many words point to the fact that refinement and mannerliness belonged in old times chiefly to cities and towns, in contradistinction to the country. Steam and electricity have changed all that. To remain civilized indeed, one must at least occasionally get away from the crowd. Civil is from *civis* a citizen; polite, from *polis*, a city; urban, from *urbs* a town. On the other hand, villain, clown, boor, signified once simply a countryman or rustic. A pagan was simply a villager, but the cities had adopted Christianity, whilst the villages still remained in heathen darkness, and so pagan became synonymous with heathen. Blackguard, has an interesting history. In olden times, when kings and such like moved from place to place, they had to take their cooks, dishes, pots and pans with them. Utensils were not so cheap or plentiful as they are now. The kitchen brought up the rear of princely equipages and was called the "blackguard." It was easy to transfer the word to the province of morals and now the blackguard is to be found as often in the van as in the rear of the social march.

Even royal blackguards have not been unknown. Here is a subject for the artist—the blackguard of the sixteenth century and the blackguard of to-day. In the use of words the employment of needless superlatives is to be deprecated, and is generally indicative of a frivolous, if not of an uncultured mind. Any fashion in that direction is more honored in the breach than in the observance. After all, "what can be quite too awfully pretty?" In regard to the use of oaths, the teaching of a distinguished professor of moral philosophy used to be, that the habit points to the want of culture. He argued that those addicted to objectionable expletives are really unable to express their emotions in any other way. An educated man, a gentleman, has many resources in the way of language, but the swearer has not. The oath is his safety valve, and he is after all no more than very vulgar, and more to be pitied than blamed. This view of the matter it may be incidentally remarked, had great effect on

the professor's class, and cured many students of an objectionable habit. To be told that swearing was sinful did not affect them in the least, but to learn that it was an indication of vulgarity was a much more serious affair. Everyone has noticed the efforts of people after gentility and position, in their designations of themselves. Gentleman, lady, esquire, professor, tonsorial artist, lavatorian, and other words indicate the tendency. With the lady in "Dombey and Son" pulling on her old black gloves, their sentiment is, "let us be genteel or die." A certain ragman even, feeling the impulse, designated himself "dealer in dilapidated dry goods." The consequence of this tendency, however, is not to lift people up, but to drag words down. Certain corruptions of language form an amusing chapter in philology. Max Müller gives a number of instances in connection with the signs of taverns: Thus, at Stoken Church Hill, in England, there is a sign exhibiting a plum and feathers. The house is known as the "Plum and Feathers." This is a travesty of the Prince of Wales' crest of a plume of feathers. So a cat and a wheel is St. Catherine's wheel. The goat and compass is a corruption of the motto "God encompasseth us." "Bull and gate" is Boulogne gate. Brasenose, Oxford, and the college exhibits an actual nose of brass,—is from "brasenhuis" or brewhouse. In the same way the sailors convert the unintelligible Bellerophon into "bully ruffian," which is within their comprehension. The word *barnacle* has made a considerable figure in its day. There is the barnacle goose and the barnacle shell-fish. The belief became prevalent from the name of the goose and shell-fish being the same, and from a certain resemblance of the latter to an embryo bird, that the barnacle goose sprang from the barnacle shell-fish; ergo it was not flesh, but fish, and consequently an orthodox dish on Fridays. The barnacle goose became a great favorite on the monks' tables. Credible witnesses were not wanting who had witnessed the metamorphosis of the fish into the bird. With their own eyes they had seen the bird come from the shell right up out of the water. A papal bull

was launched against this belief, superstition, heresy or whatever it might be called, but even the bull was not strong enough for the goose. It still made its appearance on Friday's table. Now, the barnacle goose was so named because it is the Irish goose — a good honest goose of flesh, which was converted into fish only by a kind of Irish bull. Its Latin name is "*Anser hibernicula.*" By natural steps, well known to the philologist, hibernicula became bernicula, and so on to barnacle. In the case of the barnacle shell-fish, the shell has in shape some resemblance to a leg of pork, for which the Latin is *perna.* A little leg of pork is *pernicula,* and this word was applied to the shell-fish. It by and by, just as naturally as the other, became barnacle, the consequence being that the life of many a goose was shortened, and barnacle begot a couple of bulls.

CHAPTER XXV.

LANGUAGE AND STYLE.

THE English, though a composite language, is derived mainly from the Anglo-Saxon. The classic languages, Greek and Latin, and their modern representatives, the French, Italian and Spanish, have contributed largely, but Anglo-Saxon is the chief source. To it may be traced both the *matter* of our tongue, the words that compose it, and many of the *forms* which these words assume. Modern English dictionaries contain about 38,000 words, exclusive of preterites and participles; of this number 23,000, have been found on examination to be from the Saxon, that is about 25-40 (or 5-8) of the whole. The entire number of our words including those in science and art, cannot be less than 80,000, but as applied to common style, the number 38,000 is accurate. In Shakespeare we have 15,000 different words, and in the poetry of Milton about 8,000. In common use, articles, pronouns, prepositions, conjunctions and auxiliary verbs recur more frequently than other words; and as these are generally of Saxon origin, the actual proportion in speech and writing exceeds the proportion as fixed by the dictionary. The excess differs in different writers.

In five verses of Genesis (xliii. 25-29), out of 130 words only five are not Anglo-Saxon. In five verses of John (xi. 32-36), out of 72 words only two are not Anglo-Saxon. Or combining these passages, in ten verses of Scripture, containing 202 words, 39-40 are from the Anglo-Saxon. In ten lines of Shakespeare ('to be or not to be'), out of 81 words 13 are not Anglo-Saxon. In

twelve lines of Pope, out of 84 words, 26 are not Anglo-Saxon. In 153 octavo lines taken from different authors and containing 1,492 words, there are only 296 words that are not Saxon. This reckoning gives 32-40 as the proportion of Saxon words in common use. Twenty-five out of every forty is the number as fixed by the dictionary; thirty-two out of every forty is the proportion as fixed by classic authors.

Poetry ought to contain more Anglo-Saxon words in proportion than prose, for the subjects it treats of are not much influenced by modern discovery, nor is the phraseology which describes it. Hence comes a good practical rule:—The study of poetry is a great help to the formation of a good Saxon style. *The Bible* is the richest specimen we have of the beauty and force of the old Saxon speech. In much of Scripture only one word in forty is not Saxon. How to ascertain what words are of Anglo-Saxon origin, so as to write our language forcibly and simply, is an important practical question. The following rules require no knowledge of Anglo-Saxon, and are based, *first,* on the forms of words, and *secondly,* on the things to which the words imply:

I. RULES BASED ON THE FORMS OF WORDS.

a. Our articles ('a' and 'the'), adjective pronouns ('this,' 'that,' 'few,' 'many,' 'some,' 'none'), and nearly all our conjunctions and prepositions are from the Anglo-Saxon.

b. All adjectives whose comparatives or superlatives are formed irregularly, as 'good,' 'bad,' 'better,' 'worse,' 'little,' 'less,' etc. Nearly all so-called irregular, or rather defective verbs, 'am,' 'go,' 'dare,' 'have,' etc. All our auxiliary verbs, 'do,' 'have,' 'shall,' 'will,' 'may,' 'can,' 'must,' are of Anglo-Saxon origin.

c. Nearly all words which in any of their forms undergo vowel changes are from the Anglo-Saxon, such as,

Adjectives with two forms, 'old,' 'elder.'

Adjectives forming nouns by interval vowel changes; 'strong,' 'strength;' 'long,' 'length;' 'broad,' 'breadth.'

Verbs that have modified the vowel of the noun with which

they are connected; 'bliss,' 'bless;' 'knot,' 'net,' 'knit;' 'seat,' 'set.'

All verbs with strong preterites, of which there are eight classes or more: 'fall,' 'fell;' 'hold, held;' 'draw,' 'drew;' 'slay,' 'slew;' 'fly,' 'flew;' 'give,' 'got,' 'stand,' 'take.'

All verbs which undergo vowel changes (and sometimes consonant changes also) when they cease to be intransitive; as 'rise,' 'raise;' 'lie,' 'lay;' 'sit,' 'set;' 'fall,' 'fell;' 'drink,' 'drench;' 'hound,' 'hunt.'

All nouns forming their plurals by vowel changes, as 'foot,' 'tooth,' 'goose,' 'mouse,' 'man,' 'woman.'

d. *Most* words with distinctive Anglo-Saxon endings are from Anglo-Saxon, such as nouns in 'hood,' 'head' 'ship,' 'dom;' as 'manhood,' 'godhead,' 'friendship,' 'earldom.'

Most nouns in 'ling,' 'kin,' 'ock,' 'ie,' which are nearly all diminutives; as 'darling,' 'gosling,' 'lambkin,' 'firkin,' 'hillock,' 'lassie.'

All nouns with plurals in *en*, as 'oxen,' 'children,' 'brethren.'

Most verbs in *en*, as whiten, quicken, strengthen.

Most adjectives in 'ful,' 'ly,' 'ish,' 'en,' 'ern,' 'ward,' 'some,' as fearful, kingly, blackish, childish, wooden, northern, backward, winsome.

e. Most of our words of one syllable are taken from the Anglo-Saxon. Parts of the body, head, skull, ear, tongue, lip, chin, lungs; the senses,—sight, touch, taste, smell; infirmities,—lame, blind, deaf, dumb; animals,—dog, cow, horse, bull; elements,— fire, storm, wind, thaw, frost, clouds; products,—grass, corn, bread, fowl, fish; fuel,—coal, wood, peat, turf. Some of the most forcible of modern poetry owes its power to monosyllables.

II. RULES BASED ON THINGS TO WHICH WORDS ARE APPLIED.

a. From the Anglo-Saxon we get most of the names of our earliest and dearest associations, and of the words that express the strongest natural feelings of our hearts: father, mother, hus-

band, wife, son, daughter, brother, sister, home, kindred, friends, hearth, roof, fireside, tear, smiles, blushes, laughing, weeping, sighing, groaning.

b. From the Anglo-Saxon we get the names of most objects of sense; those which occur most frequently in discourse, and which recall individual and therefore most vivid conceptions. Such are the names of objects, sun, moon, stars, earth, water, (not air); divisions of time,—day, night, morning, evening, twilight, noon, midnight, sunset, sunrise; light, heat, cold, frost, snow, hail, rain, sleet, thunder, lightning; names of objects of natural scenery; the names of the common objects of the animal and vegetable kingdoms; and the posture and motions of animal life.

c. It is almost another form of the same rule to say, that, whilst our general terms are taken mostly from the Latin, terms which describe particular objects, qualities or modes of action are taken from the Saxon. *Motion* is Latin, but creeping, walking, riding, running, are Saxon. *Color* is Latin; but black, blue, red, yellow, green, brown, are Saxon.

d. Nearly all the words which have been earliest used by us, and which, therefore, have the strongest association with the pleasant memories of our youth are of Anglo-Saxon origin. This rule follows from the preceding, but it is important, both because it accounts in some measure for the power such words have over us, and because it suggests in an agreeable way how these words may be recalled. Use the words you first learned, the words that fell from the lips most dear to you, the words that bring up the thoughts of childhood and home, and you will unconsciously speak good Saxon.

e. Most of the words that occupy our practical reason in common life, take their names from the Anglo-Saxon. It is the language of business, of the store, of the market, of the street, of the farm. We *sell* and *buy*; we find things *cheap* and *dear*; we *plow* and *sow*; we grow *rich* or *poor*.

Many words in the English language have been incorporated

into it directly from the Latin, and many indirectly through the French, Italian, and Spanish, which are all for the most part, forms of modern Latin. With the armies of Italy the ancient language overran the greater part of the Roman world. Everywhere it overlaid the original tongues, or quietly grafted itself upon them. *In Spain,* for instance, it mixed and blended with Celtiberic dialects, that is, dialects of a Keltic stock, allied to the Keltic and to the modern Biscayan,—Spanish and Portuguese were the results. In *France* it found dialects of a Keltic stock, and after a long history, formed *French.* The process began in the days of the republic, and was widely extended throughout all Gaul by the time of Julius Cæsar.

This French language assumed ultimately three or even four forms. The *Provencal* dialect was the first modern language (except Anglo-Saxon) that could boast of a literature of its own. The Gospels were translated into it in the 12th century; and its poets under the name of troubadours, were found in every court and camp in Europe. The *Norman French* was the language of William the Conqueror, and his knights. His conquest of England, and independent causes, both before and after it, gave Norman-French great influence in England; while the songs of the troubadours, and the intercourse of the English nobility with members of the house and court of Aquitaine, then ruling in the south of France, aided the Provençal in superseding or enriching at all events, the Anglo-Saxon speech. In fact, we owe to the Anglo-Norman, or to the Latin through it, most of the terms that describe the military system of the middle ages; many law terms, and others belonging to poetry and art, as duke, count, chivalry, homage, service, etc. To the other dialects of France—that is, to the Latin through them—we owe many other words in all departments of thought.

The influence of the *Keltic* on the English tongue has not been by any means so great as might be supposed; and its influence on its grammar has been even less than on its vocabulary.

The *Danish* or *Norse* element was introduced in part by the frequent visits to the north coasts of Britain, especially of the Norsemen, and, in part, by the influence of Canute and his companions. 'By' is the Norse for town, as in Derby, Whitby. The termination 'son' is Norse, as in the names Anderson, Peterson, Ericson.

Greek words are in number and importance greater than either of the last two elements. They are either completely incorporated into our language, or, like some Latin words, retain their own plurals, an evidence of imperfect incorporation; such words are automaton, plural automata; phenomenon, phenomena; cantharis, cantharides.

From the *Hebrew* come ephod, cabala, seraphim, cherubim, amen; the *Arabic*, admiral, algebra, alchemy, almanac, elixir, talisman, zero, zenith, besides the names of several animals, and articles of merchandise, giraffe, gazelle; coffee, sugar, lemon, jasmine, sherbet, syrup, sofa, mattress, mummy, sultan, pasha, assassin; the *Persian*, caravan, dervish, scarlet, azure, lilac; the *Turkish*, scimitar, divan, janissary, dragoman, and 'chause'—the last from the name of an officer of the Turkish embassy who cheated London merchants to a large amount, in the time of James I. From the *Chinese* came gong, nankin, bohea, Hyson, Congou; the *Malay*, bantam, sago, gamboge, shaddock; from *India*, calico, chintz, muslin, toddy, curry, and lac; from *Italy* come banditti, charlatan, pantaloon, gazette; from the *Spanish*, mosquito, negro, punctilio, alligator, gala; from the *Portuguese*, palaver, coco, fetish, caste, and marmalade; from the *Dutch*, yacht, sloop, schooner; ammonia is *Egyptian*; cider, *Syrian*; paradise, *Persian*. Words that may be termed distinctively *American* come from a variety of sources. Some are derived from *native Indian* languages, as squaw, wigwam, hominy, pemmican; some from the *French*, as levee, crevasse, bayou, etc.; some from the *Spniash*, as ranche, canyon, stampede, etc.; more from the *Dutch*, as patroon, boss, stoop (*porch*); new formations of *English* words, as congressional, federalist;

mileage, nullification; *English* words used in new meanings as *eagle,* coin; *corduroy,* road; to *locate,* land; new senses of old words, as to *fix,* put in order; to *guess,* think, believe; *creek,* small river; obsolete words revived or retained, as *fall,* autumn; *gully,* channel worn by water; *peek,* peep; *rare,* underdone, words from English dialects, as *bail,* handle of pail; *shack,* worthless fellow; *spry,* nimble; to *lam,* beat; *chore,* a piece of work. (Devonshire dialect.)

Names of places have originated many common names, as arras, bayonet, cherry, (Cerasus in Pontus); currants, (Corinth); copper, (Cyprus); cambric, (Cambray); cordwain, (Cordova); damask and damson, (Damascus); dimity, (Damietta); delf, (Delft); ermine, (Armenian rat); jalap, (Jalapa); magnet, (Magnesia); muslin, (Mussaul in Asia Minor); peach, (Persia); parchment, (Pergamus); spaniel, (Spain); worsted, (Worstead).

A very intereresting fact is that many words which exist in the English language exist in two distinct forms, with often widely different meanings according as they have come direct from the original language or mediately through some other language. This has already been alluded to, but some further illustrations may be given. The first of each set of the following words comes from the Latin directly, the second of each set through the French: popular, people; inimical; enemy; secure, sure; fidelity, fealty; species, spices (a *kind* of aromatic drugs); blaspheme, blame; tradition, treason; regal, royal; hospital, hotel; persecute, pursue; superficies, surface; faction, fashion; particle, parcel; potion, poison; redemption, ransom. Similarly we have adamant and scandal direct from the Greek, which stopping on their way in the Latin arrive finally in the English as *diamond* and *slander*.

A knowledge of the etymology of words is a great help to accuracy in using them; the shade of difference in meaning being often supplied by the original root. Loathing and hatred, detestation and abhorrence, for examples, seem synonymous terms. The first, however, describes the moral dislike, or nausea,

which is excited by a disagreeable object; the second, the *hot* displeasure, which even holy beings may feel against sin. *Detestation* is the earnest dislike which compels us to *bear witness* against the thing we condemn; while *abhorrence shrinks shuddering away* from some object of terror and disgust.

Similarly, arrogant, presumptuous, insolent, impertinent, saucy, rude, seem at first nearly synonymous terms. But examining their roots we find that an *arrogant* man *claims* more honor and observance than are his due; a *presumptuous* man *takes* things *before* he has a right to them; an *insolent* man violates the *customary* rules of society; whilst an *impertinent* man seeks to know or to meddle in things which *do not belong* to him; a *saucy* person says and does stinging things, pungent things, *bitter* as *salt;* while *rudeness* describes the behavior of those who *know no better*.

Archbishop Whately notes that the variety of our language enables a sophist to assume the appearance of giving a reason, when in fact he is only repeating his assertion in words taken from another source; as when the propriety of affording to all mankind "an unlimited liberty of expressing their sentiments, is stated as a plea for 'freedom of speech.'"

COMPOSITION AND STYLE.

The first great essential of all good composition is *thought.* An earnest man *with a subject* in which he feels a deep interest, will nearly always be an acceptable speaker. There are some exceptions to this rule; but generally to have *something to say* is essential. The art of seeming to say something, when we mean nothing, is for the most part an *attainment* and not a gift. Eloquence is speaking *out* of something *within.* If there is nothing within we call it loquacity, a poor power,—froth without substance, the greatest impertinence of the pulpit and the platform.

The next stage of composition is to define, in our minds at least, what we intend to prove or illustrate. If an argument is to be set forth it must be defined in proportions; if an illustra-

tion, the details must be carefully grouped, and clearly described. Unless this is done we shall write or speak without force. Having resolved what it is we intend to prove or illustrate, the next concern of a writer should be to mark, in a general way, the successive stages of his progress. The old plan of indicating in the margin the subject of a paragraph, had the great advantage of compelling the writer to define it to himself, while it helped the reader to see his way. The practice might well be revived in modern literature. Having accumulated thoughts with a definite purpose, and having decided in our own minds how we mean to group them, the next question is, how are we to place them on canvas? Having something definite to say, how are we to say it?

One of the most fatal mistakes in relation to style, is to suppose that a writer who wishes to be natural must dispense with all toil and pains in composition. This mistake has been sanctioned by very different writers. "Never think," says Cobbett, "of mending what you write; let it go; no patching." "Endeavor," says Niebuhr, "never to strike out anything of what you have once written down. Punish yourself by allowing once or twice something to pass, though you see you might give it better." But it is none the less to be condemned. Composition that costs little is generally worth little. Easy writing is very hard reading; and for young and unpracticed writers to forget this principle is to make themselves and their work ridiculous.

It may help to console those who are not acquainted with the classic languages to know that some of the greatest writers have been in the same position. Shakespeare, Cobbett, Izaak Walton, John Bunyan, Benjamin Franklin, Hugh Miller, all excelled as authors. The style of each is copious, clear and idiomatic; and the style of two of them — Franklin and Miller — is remarkable for richness and accuracy. Yet when their chief works were written they knew no foreign tongue. Their writings, therefore, illustrate the wealth of idiomatic English, and the possibility of mastering the language by the study of English literature alone.

How then are our thoughts to be expressed, remembering that style is an art to be sedulously cultivated? What habits are we to cultivate, so as to acquire the power of expressing them? In brief, we need in our *words* copiousness, accuracy and propriety; in our *sentences*, clearness, unity, strength and harmony; and in our *paragraphs* a living connection between each other.

WORDS.

A copious phraseology is one cure for wordiness. It helps us to the very words we need. To attain this, good authors should be read, and the society of intelligent people cultivated. More than one eminent author has affirmed that he learnt more in this respect from the society of intelligent women than from any other source. Accuracy is even more important than copiousness. It teaches us to give each word its exact meaning; makes verbiage as unnecessary as it is always displeasing, and tends to produce conviction even when the mind is not disposed to be convinced. The man who says exactly what he means commends his case no less to our judgment than our taste. He has one of the qualities of a great teacher: he seems to have insight, and he can tell what he sees.

Care must be taken not to be misled by apparent synonyms, of which long lists are commonly to be met with. The fact is, that true synonyms in the English language, or in any language, are extremely rare. At certain stages in the progress of a language, they are numerous; but they stay for a time only. The superfluous words are soon used for a new purpose, or are gradually laid aside. To distinguish between *apparent* synonyms is a process that requires delicacy, clearness and practice.

Propriety in the use of words is a principle less absolute than either of the preceding. As a rule, words of Anglo-Saxon origin are most appropriate when we describe individual things, natural feelings, domestic life, the poetry of nature; words of Latin origin when we describe the results of generalization or of abstraction, or the discoveries of science. Is it philosophy you

discuss? Then "the impenetrability of matter" will be found a better phrase than its Anglo-Saxon equivalent "unthoroughfare-someness of stuff." Is it natural feeling? Then "paternal expectations" and "maternal attachment" are less impressive than "father's hopes" and "mother's love."

SENTENCES.

The first grand essential quality of sentences is clearness. Speech is properly thought incarnate, as literature is thought incarnate and more or less immortal. Each fulfills its mission only when the whole spirit of the thought is represented in the form. Young thinkers sometimes mistake darkness for depth, and suppose that whatever is perspicuous must be superficial. Clearness is to speech what a good lens is to the telescope: without it objects appear distorted, or they appear unseen. It is what fine atmosphere is to scenery. It makes the whole field visible, and bathes the landscape itself with fresh glory. One of the first requisites to clearness is grammatical accuracy. We ought not have to guess at a writer's or speaker's meaning. Bad grammar is injustice to truth. The chief attention, however, of a writer who studies clearness needs to be given to the arrangement or collocation of his words. Their position generally indicates in English the connection and the sense. It is therefore of the last importance.

Two rules are of frequent use and great advantage:

I. *Words that express things connected in thought should be placed as near to each other as possible, unless another arrangement be required for the emphasis.* This prevents ambiguity.

II. *Where words or clauses are so placed as to be susceptible of a double reference, the construction must be changed:* as when pronouns are repeated and may refer to different persons or things, or when an explanatory or modifying clause is placed between two members of a period, for example:

"This work in its full extent, *being now afflicted with an asthma, and finding the power of life gradually declining,* he

had no longer courage to undertake.—*Johnson: "Life of Savage."*

Apart from all rules, the great requisite of a clear style is clear thinking. If an object is not distinctly seen, it cannot be distinctly described; nor can any mechanical combination of words give an adequate conception of what the speaker himself has not adequately conceived. But while clearness is one essential to good style, one must carefully guard against three faults, which are sometimes excused on the plea that clearness requires us to commit them. Some writers, for example, think they are never clear, unless they describe minutely every part of a subject, and indicate every step of an argument. Nothing is left to the imagination of the reader. Such a style commits the same mistake as a map-maker who inserts all the villages and streams of a country, instead of contenting himself with the principal towns and rivers. The effect is that the smaller places cannot be discovered without a glass, while, by their presence on the map, what otherwise would be clear is completely concealed. A master of composition has justly observed that "Thucydides and Demosthenes lay it down as a rule never to say what they have reason to suppose would occur to the auditor or reader in consequence of something said before; knowing that every one is more pleased and more easily led when we bring forward his thoughts indirectly and imperceptibly, than when we elbow them and outstrip them with our own." Not less mischievous is the process of blending with narrative or argument maxims or sentiments so commonplace and trivial as to be taken for granted by all hearers or readers. Men sometimes think that in such cases it is the clearness that is condemned, when in truth it is the triteness. The cure is to be sought, not in obscurity of style, but in freshness of thought.

A third mistake is committed when writers or speakers confound "literal" and "clear." They suppose that nothing is clear that is figurative, and in seeking to be perspicuous become only dull and uninteresting. This is the type of the *prosy* speaker,

the most tiresome being on the face of the earth. Let it be noted that plain writing may be highly figurative; and that if the theme be abstract or spiritual, figurative language is almost essential to perspicuity. The second important quality in sentences is *unity*. A sentence is a thought put into words; *one* thought, not many. It is upon this definition of a sentence that all rules in relation to unity rest. Once let it be understood that a sentence is the expression of an entire thought and only one, and the necessity for distinct rules is greatly diminished. Let it be carefully noted that unity does not forbid any extension of the predicate, or any enlargement of the subject, or of the complement of the predicate. These may be enlarged or extended to any degree, *provided the objects described as parts of the thought make one picture, or sense.*

Here, for example, is an enlargement of the subject:

"The trim hedge, the grass-plot before the door, the little flower-bed bordered with box; the woodbine trained up against the wall, and hanging its blossoms around the lattice; the pot of flowers in the window; the holly planted providentially around the house, to cheat winter of its dreariness, and throw in a semblance of green summer to cheer the fireside;—all these bespeak the influence of taste.—*Washington Irving: "Rural Life in England."*

Parenthetic clauses ought to be avoided. They are allowable, however, when they contain brief explanatory phrases intended to narrow or define the sense; and occasionlly when they suggest a by-thought which it is important not to withhold, but which has no proper place as a distinct sentence in the paragraph.

Strength is that quality of speech that fits it to impress, and, if need be, to move the minds of men. When words have their full force they produce a threefold effect upon the hearer. The *sound* is harmonious; the *representation* of the thing for which it stands is clear and vivid; and there is emotion excited by one or more of the foregoing. Such is Burke's enumeration of the results of style when it has done its utmost. But, after all,

practice is the grand secret of effectiveness in this as in every other art. Write much; write frequently; write quickly; and polish afterwards; and you will be sure to succeed. The last two rules are Johnson's. He strongly advises young composers to train their minds to start promptly, for it is easier to improve in accuracy than in speed. Robert Hall's experience confirms this rule. He used to lament that his progress in composition was so slow and laborious that he could write comparatively little, while what he wrote had an air of stiffness from which his spoken style was free. Whether these rules are acted on or not, the two former are absolute. Excellence in composition is a great power and its lowest price,—for most—is *patient toil.*

LETTER-WRITING.

To some extent only the rules that have been given for style are applicable to letter-writing. Some well educated people find it very difficult to communicate their thoughts even in a friendly epistle. Much of the difficulty arises from a species of nervousness, and it is a good rule to throw aside rules in the matter of friendly communications. Try to write just as you would speak, keeping as vividly before you as possible, the friend to whom you are writing. It may be a help to utter *aloud* what you wish to say, just as if your friend were actually present, and then write down word for word, as if in conversation what you have said. The great charm in an epistle is *spontaneity* and no dread of solecisms or misspelling should be permitted to destroy that. A friend will think little of a slip in grammar or in spelling if your style is so natural and living that you seem almost to be speaking in your letter. Nothing is so disappointing in a familiar epistle as a *prosy*, stilted, style. In business correspondence the best way is to know exactly what you wish to say, and to say it in the shortest and simplest way, making no effort at style.

CORRECT AND GRACEFUL SPEECH.

Bacon says that reading makes a full man; writing a correct

man; and speaking a ready man. It is to be desired that not only readiness but gracefulness were more studied in speaking. Few things are more captivating than the art of saying in conversation whatever one has to say, in simple and appropriate language. To this end it ought to be remembered that graceful speech, and good manners begin *at home,* as charity is said to do. The school may do a good deal for us in this respect, although many school teachers use indifferent grammar when out of school, but our social surroundings will most of all determine the quality of our speech. One can readily detect the young man or woman who has, in this respect, been gently reared. It is far more essential, and, in the best way, remunerative, than to have had a distinguished grandfather. For youth, then, there could be no better advice given than this: Practice correct and graceful speech at home, and cultivate the society of those who do the same.

CHAPTER XXVI.

LITERATURE OF AMERICA.

IT CAN be no longer asserted, as it was once with a considerable degree of truth, that America has no literature of its own. In order to have a national literature, or national art of any kind, there must first be a national character, and the astonishing fact is, not that this country should take some time to realize its own individuality in artistic creations; but that in so marvelously short a period this result has been achieved. The very fact of the English tongue, shared in common with the parent country; the magnificent wealth of genius which is the common inheritance of the Briton and American; that further, the citizens of this republic had their hands full with the immediate concerns which are necessary to the sustenance and conduct of civilized life, seemed to militate against those efforts of genius, for which wealth, habits of leisure and long established institutions have been deemed material requisites. One might have predicted sweet snatches of song, "native woodnotes wild;" the martial ode, or even the thrilling story of war or adventure; but, otherwise, it was natural enough to expect that cycles of years must pass, in which a busy people would continue to look to those brought up amid associations and circumstances all tending to foster genius and mature thought, for the graver and more sustained productions of the scholar, the statesman, the divine and poet. As it really is, the mere titles of the books written by American authors, the product of minds nurtured, trained, developed, matured on American soil, evincing the nationalizing effect of manners, habits, scenery,

circumstances and institutions peculiar to it, would fill a considerable volume. The distinctive literature of this country may be said to begin in the speeches and letters of such men as James Otis, the elder Adams, Washington, Hamilton, Jefferson, Jay, Madison and other patriots of the revolution. In the province of history there are no more distinguished names than Irving, Prescott, Bancroft, Hildreth and Motley. Theology and Biblical literature are represented by many names, of whom Dwight and Barnes are perhaps most widely known. The American novelist "fronts it in the van of all the congregated world;" whilst there is no modern poet more distinctly national and yet dear to the whole world than Longfellow. These things are so, and this is the marvel.

Jonathan Edwards (1703-1758), born at East Windsor, Conn. A man, a Christian, a divine and a philosopher; one of the greatest and best men that have adorned this or any other country since the apostolic age. Author of "The History of the Work of Redemption," and "The Freedom of the Will and Moral Agency."

Benjamin Franklin (1706-1790), born in Boston; a distinguished philosopher and statesman. He brought out his celebrated almanac in 1732 (commonly known as "Poor Richard's Almanac); also "A Plan for Improving the Condition of the Free Blacks. His life and works, by Sparks, is in ten volumes.

Francis Hopkinson (1737-1791), Philadelphia; studied law and became judge of the United States; wrote "Ambiguity of the English language; "Whitewashing"; "A Typographical Method of Conducting a Quarrel; "The Battle of Kegs." He had unrivalled powers of wit and satire.

Thomas Jefferson (1743-1826), Virginia; became President; "Summary View of the Rights of British America; "Notes on Virginia."

Benjamin Rush (1745-1813), Philadelphia; physician; "Inquiry into the Effects of Ardent Spirits on Body and Mind; "Medical Inquiries and Observations on the Diseases of the

Mind. A philanthropist, and one of the earliest friends of temperance reform.

Lindley Murray (1745-1826), Sevatara, near Lancaster, Penn.; lawyer and merchant; a distinguished philologist; his most famous work was his "English Grammar; first publication; "The Power of Religion on the Mind"; his "English Reader" is well known. No other school-books have ever enjoyed so wide a circulation as Lindley Murray's.

John Ledyard (1751-1788), Groton, Conn.; a celebrated traveller; wrote "A Journal."

David Ramsey (1749-1815), Lancaster county, Penn.; physician and statesman; "History of the American Revolution"; "Life of Washington"; "Biographical Chart; "Eulogium on Dr. Rush."

John Trumbull (1750-1831), Waterbury, Conn.; tutor at Yale College, studied law and became judge of the Superior Court; author of the celebrated poem "McFingal." "A scholar, a wit, a gentleman."

Timothy Dwight (1752-1817), Northampton, Mass.; tutor at Yale College, clergyman, President of Yale, and, at the same time, professor of theology; a voluminous writer, pleasing as a poet, and learned and eloquent as a divine; poems: "The Conquest of Canaan," "Greenfield Hill," etc.; theological works: "Theology Explained and Defended in a Series of Sermons;" "The History, Eloquence and Poetry of the Bible," etc.; he wrote also "Travels in New England and New York."

Philip Freneau (1752-1832), born in New York; edited several journals; a celebrated poet in the period of the American Revolution; first edition of his poems published in Philadelphia, 1786, entitled "The Poems of Philip Freneau, written chiefly during the Late War."

John Barlow (1755-1812), Reading, Fairfield county, Conn.; lawyer, chaplain and editor; author of "The Columbiad," a poem; "Hasty Pudding," and various patriotic songs and addresses.

John Marshall (1755-1835) Virginia, Chief Justice of United States; "A Life of Washington;" "The History of the American Colonies;" and a work on "The Federal Constitution."

Noah Webster (1758-1843), West Hartford, Conn.; lawyer, teacher, and political writer; his "Spelling Book," "English Grammar," and a compilation for reading, have had a very wide circulation; his celebrated work, "The American Dictionary of the English Language," engaged his energies for twenty years, in which he met with many difficulties and discouragements.

Joseph Dennie (1768-1812), Boston; studied law, but abandoned law for letters; became the editor of the "Farmer's Magazine," in which he commenced the essays entitled "Lay Preacher," which laid the foundation of his literary reputation. He edited "The Portfolio" for twelve years. "By its talent, vivacity, taste and variety, it did more, perhaps, than any other publication of that time, on this side of the Atlantic, to refine the taste of the people, and to give a relish for choice reading, and for literary pursuits."

Joseph Hopkinson (1770-1842), Philadelphia; studied law and became judge; chiefly known as the author of the popular song, "Hail Columbia."

Charles Brockden Brown (1771-1810), Philadelphia; followed literary pursuits, wrote novels of a highly sensational kind, as "Wieland;" "Arthur Mervyn, or Memories of the Year 1793;" "Edgar Huntly, or the Adventures of a Sleep-Walker;" "Clara Howard." He conducted "The Literary Magazine and American Register;" started an "Annual Register;" and contributed to the "Portfolio."

Samuel J. Smith (1771-1835), one of the Smiths of Burlington, New Jersey, poet. A volume of his poetry was published after his death.

Josiah Quincy (1772-1864), Boston; statesman and scholar; President of Harvard University; wrote "A History of Harvard University;" "Memoir of James Grahame, Historian of U. S., etc.

Archibald Alexander (1772-1851), Lexington, Va.; Professor of Didactic and Polemic Theology at Princeton; works: "Evidences of the Christian Religion," "The Canon of the Old Testament Ascertained;" "Outlines of Moral Science," etc.

William Wirt (1772-1834), Bladensburg, Md.; Attorney-General of the United States; wrote "The British Spy;" "The Old Bachelor;" "The Life of Patrick Henry."

Robert Treat Paine (1773-1811), Taunton, Mass.; author of the celebrated political song, "Adams and Liberty."

William Sullivan (1774-1839), Saco, Me.; law; works: "The Political Class Book;" "The Moral Class Book;" "Historical Class Book;" "Historical Causes and Effects from the Fall of the Roman Empire, 476, to the Reformation, 1517." His best work is the "The Public Men of the Revolution."

Lyman Beecher (1775-1863), New Haven, Conn.; clergyman; published many discourses and sermons, amongst which are,—"Remedy for Duelling," and "Six Sermons on the Nature, Occasions, Signs, Evils, and Remedy of Intemperance." He wrote also a work entitled, "Political Atheism."

James K. Paulding (1779-1860), Pleasant Valley, Dutchess county, N. Y. Head of the Navy Department of the United States; a satirist; wrote "Salmagundi" conjointly with Washington Irving; "The Diverting History of John Bull and Brother Jonathan;" "John Bull in America, or the New Munchausen;" "Merry Tales of the Three Wise Men of Gotham;" "The New Pilgrim's Progress." His best novel is the "Dutchman's Fireside;" others, "The Old Continental," and "The Puritan's Daughter."

William Tudor (1779-1830), Boston; "gentleman and man of business, scholar and man of the world;" projector and first editor of the "North American Review;" contributed largely to the "Monthly Anthology;" published "Letters on the Eastern States," and the "Life of James Otis."

Francis Scott Key (1779-1843), Frederick county, Md.; district attorney for the city of Washington; author of the national song, "The Star Spangled Banner," and sacred lyrics.

Joseph T. Buckingham (1779——), Windham, Conn.; journalist; projected several successful journals, and commenced "The New England Magazine;" published "Specimens of Newspaper Literature, with Personal Memoirs, Anecdotes, and Reminiscences; and Personal Memoirs and Recollections of Editorial Life."

Washington Allston (1779-1843), Charleston, S. C.; scholar, artist and poet. "The Sylphs of the Seasons," and other poems.

Benjamin Silliman (1779-1864), Trumbull, Conn.; Professor of Chemistry and Geology; founder of the "American Journal of Science and Art;" and named the "Father of American Periodical Science."

Timothy Flint (1780-1840), Reading, Mass.; sometime clergyman and afterward curator of a literary institution; wrote "Recollections of Ten Years in the Valley of the Mississippi;" "Lectures upon Natural History, Geology, Chemistry; the Application of Steam," and "Interesting Discoveries in the Arts." He produced several novels, one, "Francis Berrian, or the Mexican Patriot," and his last, "The Shoshonee Valley." He is amongst the earliest historians and scene painters of our Western country.

William Ellery Channing (1780-1842), Newport, R. I.; clergyman and champion of freedom; his "Letters to Henry Clay" against the plot to extend the area of slavery are celebrated. His contributions to the "Christian Examiner," with his sermons, addresses and miscellaneous works, are published in six volumes.

John James Audubon (1782-1851), New Orleans; distinguished naturalist; author of "The Birds of America."

Daniel Webster (1782-1852), Salisbury, N. H.; "most distinguished of all American statesmen and orators;" his discourse in commemoration of the landing of the pilgrims is famous. His works with his life are in six volumes.

Joseph Story (1782-1845), Marblehead, Mass.; eminent jurist and scholar; edited "Abbot on the Law of Shipping;" pub-

lished "Commentaries on the Constitution of the United States;" and contributed to the "North American Review."

Washington Irving (1783-1859), New York, the most distinguished of American prose writers. To the world he is in prose what Longfellow is in poetry. He has his niche in the Westminster Cathedral of every true heart. We have seen that with Mr. Paulding he produced "Salmagundi," a work that had an immediate success; this was followed by "The History of New York, by Diedrich Knickerbocker." Irving later on edited the "Analectic Magazine;" in 1818 he gave to the world his delightful "Sketch-Book;" there followed "Bracebridge Hall;" "Tales of a Traveler;" "The Life of Columbus;" "Chronicles of the Conquest of Grenada;" "Tour of the Prairies;" "Abbotsford and Newstead Abbey;" "Legends of the Conquest of Spain;" "Astoria;" "The Adventures of Captain Bonneville;" "Life of Goldsmith;" "Life of Washington." In 1842 he was appointed minister to Spain. One thinks instinctively of Irving, however, not in connection with university degrees, or official positions, but as the ideal man of letters.

Samuel Woodworth (1785-1842), Scituate, Mass.; journalist, published a weekly miscellany called "The Ladies' Literary Gazette," in New York; afterwards, in conjunction with George P. Morris, established "The New York Mirror," long the most popular journal of literature and art in this country; wrote an "Account of the War with Great Britain;" and a volume of "Poems, Odes and Songs, and other Metrical Effusions." His is the well-known song, "The Old Oaken Bucket."

Andrews Norton (1786-1853), Hingham, Mass.; D. D., and Dexter Professor of Sacred Literature; wrote "Evidences of the Genuineness of the Gospels," and contributed largely to periodicals.

Richard H. Dana (1787-1879), Cambridge, Mass.; poet and essayist; assisted Prof. E. T. Channing in editing the "North American Review," in which his first poem, "The Dying Raven," appeared; published his "Idle Man" in numbers;

author of "The Buccaneer," and other poems; and "Poems and Prose Writings."

James Fenimore Cooper (1789-1851), Burlington, N. J.; six years in the United States navy; a celebrated novelist. "The Spy" established his fame, and was published in England and on the Continent; there followed "The Pioneers;" "Leather Stocking Tales;" "The Prairie;" "The Last of the Mohicans;" "The Pathfinder;" "The Deer Slayer," etc. Among his nautical novels are, "The Pilot;" "The Red Rover;" "The Water Witch;" "The Two Admirals," etc. He wrote in all thirty-four novels, and also "History of the United States Navy;" "Gleanings in Europe;" "Sketches in Switzerland."

James A. Hillhouse (1789-1841), New Haven, Conn.; wrote "Percy's Masque," a Drama in Five Acts; "Hadad," a Dramatic Poem: "Demetria," a Tragedy in Five Acts, and "Sachem."

William Jay (1789-1858), city of New York; a warm advocate of Sunday schools, temperance, peace, and for many years president of the American Peace Society; wrote "The Life and Writings of John Gay;" "An Inquiry into the Character and Tendency of the American Colonization, and American Anti-Slavery Societies;" A View of the Action of the Federal Government in Behalf of Slavery;" "Miscellaneous Writings on Slavery;" "History of the Mexican War."

Jared Sparks (1789-1866), Wilmington, Conn.; Professor of Ancient and Modern History, and afterward Principal of Harvard University; editor of "North American Review;" author of important historical works; "Life of John Ledyard;" "The Diplomatic Correspondence of the American Revolution;" "The Life of Governor Morris;" "The Life of Washington;" "The Works of Benjamin Franklin;" "Correspondence of the American Revolution;" he also commenced the "Library of American Biography."

Lydia Huntly Sigourney (1791–1865), Norwich, Conn.; wrote "Letters to Pupils;" "Letters to Young Ladies;'

"Whispers to a Bride," and "Letters to Mothers;" many works for the young on temperance and other subjects. Everything she has written has been pure and elevating in its whole tone and influence." She wrote also much in verse.

Alexander H. Everett (1791–1847), Boston; lawyer and diplomatist, one of the most eminent literary men of our country; principal works, "Europe: A Treatise on the Political Condition of Europe in 1821;" "America: New Ideas of Population."

George Ticknor (1791–1871), Boston; Professor of Modern Languages and Literature in Harvard University, wrote "The History of Spanish Literature." His "Life of Lafayette," contributed to the "North American Review," has gone through several editions.

Charles Sprague (1791–1875), Boston; banker; a finished poet and graceful prose writer; his best political productions are "Shakespeare Ode" and "Curiosity."

John Howard Payne (1792–1852), city of New York; author of a number of dramas, and other poems, but most notable for the favorite "Home, Sweet Home," which he introduced, when in London, into an opera called "Clari; or, the Maid of Milan."

Seba Smith (1792–1868), Buckfield, Me.; journalist; author of "Letters of Major Jack Downing;" "My Thirty Years Out of the United States Senate, by Major Jack Downing;" and a volume of humorous stories entitled "Way Down East;" and "New Elements of Geometry."

Henry C. Carey (1793–18.9), Philadelphia; political economist of world-wide reputation; his works, "Laws of Wealth; or, Principles of Political Economy," and "The Past, the Present and the Future," have been translated into several European languages.

Samuel G. Goodrich (1793–1860), Ridgefield, Conn.; the well known "Peter Parley." Miscellaneous works, including fourteen volumes of "The Token," comprise 30 vols; School-

Books, 27 vols; Tales under the name of "Peter Parley," 36 vols; Parley's Historical Compends, 36 vols; Parley's Miscellanies, 70 vols; in all 177 volumes. "Of all these," he says, "about seven millions of volumes have been sold."

William Cullen Bryant (1794–1878), Cummington, Mass.; a poet of the highest order, in his own delightful walk; his "Thanatopsis," written before he was nineteen, has such a beauty and calmness, such a wealth of that sweet wisdom which comes only rarely to the few after long years that we might almost fancy the poet had learned his lesson in a previous existence. Instinctively we think of the conception—

"Our birth is but a sleep and a forgetting;
"The soul that resteth in us, our life-star,
"Hath had elsewhere its setting,
"And cometh from afar,
"Not in entire forgetfulness,
"And not in utter nakedness,
"But trailing clouds of glory do we come
"From God, who is our home."

Bryant, although thus precocious did not exhaust himself in a single magnificent effort; a year later came his "Inscription for an Entrance into a Wood;" three years afterward "The Waterfowl," and in 1821, his longest poem, "The Ages." He did much good work, was a lawyer, an editor, and traveled much, as poets love to do, but it is as a poet we cannot but think of him with a thought that excludes all others. He is related to us by a sympathy that is jealous of all earthlier relations.

John Neal (1793–1876), Portland, Maine; litterateur; author of "Keep Cool," a novel written "chiefly for the discouragement of dueling;" "The Battle of Niagara," with other poems; a novel, "Brother Jonathan," etc., etc. He was versatile to a fault.

Edward Robinson (1794–1863), Southington, Conn.; philologist and Biblical critic. Works: various valuable translations; "Lexicon of the New Testament;" "Biblical Researches in

Palestine." He projected and established "The Bibliotheca Sacra."

Edward Everett (1794–1865), Dorchester, Mass.; younger brother of A. H. Everett; orator and statesman. Works: "A Defense of Christianity;" Miscellaneous Writings, 2 vols; Orations and Speeches, 2 vols.

Joseph Rodman Drake (1795–1820), city of New York; poet and author of "The Culprit Fay," a work of exquisite fancy.

Fitz-Greene Halleck (1795–1867), Guildford, Conn.; poet; author of "Fanny," a satirical poem; "Alnwick Castle," and above all of the ode "Marco-Bozzaris." He writes a charming tribute to Burns.

James Gates Percival (1795–1856), Berlin, Conn.; scientist and literator; wrote "Prometheus," a poem in the Spenserian measure; "The Dream of Day;" and many other poems, displaying rich fancy, pathos and rare command of language.

William B. Sprague (1795–1876), Andover, Conn.; divine; a voluminous author on religious subjects; author of "Annals of the American Pulpit."

Sarah Josepha Hale née *Buell* (1795–1879), Newport, N. H.; wrote a large number of prose works and poems, edited "The Ladies' Magazine," the first periodical in America exclusively devoted to woman, and afterwards "The Lady's Book." Her "Woman's Record, or Sketches of all Distinguished Women," from the beginning till A.D. 1850, is very valuable for reference.

Francis Wayland (1796–1865), city of New York; President of Brown University; divine and moral philosopher; author of "Moral Science," "Political Economy," and "Intellectual Philosophy."

William Hickling Prescott (1796–1859), Salem, Mass.; eminent historian; deprived in youth by an accident, of an eye, and working at great disadvantage with the other, which became weak by sympathy; a man of genius, of fortitude, and of amiability; an ornament to his own country and the admiration

of other lands. "History of Ferdinand and Isabella;" "Conquest of Mexico;" "Conquest of Peru;" "The History of the Reign of Philip the Second."

Catharine Maria Sedgwick (1789–1867), Stockbridge, Mass.; daughter of Theodore Sedgwick, jurist and statesman; a delightful writer of tales whose tendency is altogether for good. Her "Morals of Manners" is said to have had a happy influence in educating the *manners* of the young.

John Gorham Palfrey (1796-——), Boston; LL.D.; divine and historian; author of "A History of New England."

William Ware (1797-1852), Hingham, Mass.; divine; author of "Zenobia, or The Fall of Palmyra, an Historical Romance;" "Aurelian;" "Inlian, or Scenes in India."

John G. C. Brainard (1796-1828), New London, Conn.; editor of "Connecticut Mirror," Hartford. His "Literary Remains" are published with a memoir by Whittier.

Albert Barnes (1798-1870), Rome, N. Y.; divine; the author of many valuable commentaries, and especially famous for his "Notes" on the New Testament.

Robert Charles Sands (1799-1832), city of New York; journalist; "Yamayden," a poem; editor of "New York Review."

George Washington Doane (1799-1859), Trenton, N. J.; D.D., LL.D., Bishop; "Songs by the Way," chiefly devotional.

Lydia Maria Child, née *Francis* (1802 ——), Massachusetts; philanthropist, and authoress of many biographies, tales, and other improving works.

George Bancroft (1800-——), Worcester, Mass.; eminent historian; author of "The History of the United States."

George P. Morris (1802-1864), Philadelphla; Brigadier-General in the military organization of New York; "The Song-Writer of America;" editor of "The New York Mirror," "The New Mirror," and "The Home Journal;" works: "The Deserted Bride, and other Poems;" "The Whip-poor-will," a poem; "American Melodies." Some of his songs—and it is by these

he will live—are "Life in the West," "When Other Friends are Round Thee," "Up with the Signal," "Woodman, Spare that Tree," "My Mother's Bible."

George Denison Prentice (1802-1870), Preston, Conn.; journalist and poet; editor of the "Louisville Journal;" he has written much beautiful poetry for his own journal and other periodicals.

Ralph Waldo Emerson (1803-1882), Boston; eminent essayist and philosopher; chief works: "Man Thinking," "Literary Ethics;" "Nature, an Essay;" "The Dial," a magazine of literature, philosophy and history; "The Method of Nature;" "Man, the Reformer;" "New England Reformers;" "The Young American;" "Negro Emancipation in the West Indies;" a volume of "Poems;" "Representative Men."

Horace Bushnell (1802-1876), Washington, Conn.; D.D.; clergyman; chief works: "God in Christ;" "View of Christian Nurture;" "Christ in Theology;" "Sermons for the New Life;" "Sermons on Living Subjects;" "Nature and the Supernatural as Together Constituting the One System of God."

George W. Bethune (1805-1862), city of New York; D.D.; clergyman and poet; Chancellor of the University of New York; chief works: "The Fruit of the Spirit;" "Early Lost, Early Saved;" "History of a Penitent, or Guide to an Enquirer;" an edition of "Walton's Angler," with copius literary and biographical notes; "Lays of Love and Faith, with other Fugitive Poems;" "The British Female Poets, with Biographical and Critical Notices;" and many orations and lectures.

Caroline M. Kirkland, née *Stansbury* (1801-1864), city of New York; lived in Detroit, Mich., for two years, and for six years about sixty miles west of it; wrote, "New Home, Who'll Follow, or Glimpses of Western Life, by Mrs. Mary Clares;" "Forest Life;" "Western Clearings;" and many other works, including "Memoirs of Washington."

Nathaniel Hawthorne (1804-1864), Salem, Mass., one of America's most distinguished writers; "Twice Told Tales;"

"The Journal of an African Cruiser;" "Mosses from an Old Manse;" "The Scarlet Letter;" "House with the Seven Gables;" "True Stories from History and Biography;" "The Blithedale Romance," etc.

Charles Fenno Hoffman (1806- ——), city of New York; journalist; co-editor of the "New York American;" first editor of the "Knickerbocker Magazine;" proprietor of the "American Monthly Magazine;" and for one year editor of the "New York Mirror;" works: "A Winter in the West;" "Wild Scenes in Forest and Prairie;" "Greyslaer, a Romance;" "The Vigil of Faith, A Legend of the Adironack Mountains, and Other Poems;" "Love's Calendar."

William Gilmore Simms (1806-1870), Charleston, S. C.; novelist, historian and poet; principal poetical work, "Atalantis, a Story of the Sea;" novels: "Martin Faber;" "Guy Rivers;" "Yemassee;" "The Partisan," "Mellichampe;" "Pelayo;" "Carl Werner;" "Richard Hurdis;" "Damsel of Darien;" etc.; biographical and historical works comprise lives of Captain John Smith, General Marion, Chevalier Bayard, and a "History of South Carolina."

Nathaniel Parker Willis (1806-1867), Portland, Me.; poet and journalist; works: "Pencilings by the Way;" "Inklings of Adventure;" "Loiterings of Travel;" "Letters from under a Bridge;" two tragedies, "Tortesa, the Usurer," and "Bianca Visconti," under the title of "Two Ways of Dying for a Husband."

CHAPTER XXVII.

LITERATURE OF AMERICA.

(Continued.)

HENRY WADSWORTH LONGFELLOW (1807-1882), Portland, Me., a poet enshrined in the heart of the world, who has not given expression to a single thought that the purest might regret; as sweet and true, noble and living a child of genius as ever breathed God's fresh air and bathed in his sunshine. He "sings on one clear harp to diverse tones." No one by the authority of his beautiful nature has ever been more entitled to comfort us in our sorrows with such words as these:

> "There is no death, what seems so is transition;
> This life of mortal breath
> Is but the suburb of the life Elysian
> Whose portal we call death."

Such lives as his,—and his verse is the utterance of his life—is to many a greater assurance of immortality than any dogma, however authoritative. We think of his song when we read his own words:

> Oh that dew, like balm, shall steal
> Into wounds that cannot heal,
> Even as sleep our eyes doth steal;
>
> And that smile like sunshine, dart
> Into many a sunless heart,
> For a smile of God thou art.

He studied at Bowdoin College, Brunswick, and soon after graduating was offered there a professorship of modern languages,

to prepare himself for which he went to Europe and traveled for three and a half years, residing in France, Spain, Italy, Germany, Holland ánd England. In 1835 he was elected Professor of Modern Languages and Belles-Lettres in Harvard College, when he again went abroad and spent more than a year in Denmark, Sweden, Germany and Switzerland. He resigned his professorship in 1854.

In 1835 was published his "Outre-Mer," a collection of sketches and essays; in 1839, "Hyperion, a Romance," and "Voices of the Night," his first collection of poems; afterwards, in succession, "Ballads and Other Poems;" "Poems on Slavery," "The Spanish Student," a play; the "Poets and Poetry of Europe;" "The Belfry of Bruges;" "Evangeline;" "Kavanagh, a Tale;" "The Seaside and the Fireside;" "The Golden Legend;" "The Song of Hiawatha;" "The Courtship of Miles Standish;" "Tales of a Wayside Inn;" "Poems of Places."

George Barrell Cheever (1807 ——), Hallowell, Me.; clergyman; a philanthropist and temperance reformer; works,—"American Common-place Book of Prose;" "American Common-place Book of Poetry;" "Studies in Poetry with Biographical Sketches of the Poets;" "Selections from Archbishop Leighton, with an Introductory Essay;" "God's Hand in America," etc.

Richard Hildreth (1807-1865), Deerfield, Mass., historian of the United States; took chief part in founding the "Boston Atlas;" wrote the powerful novel "Archy Moore;" "Despotism in America;" "History of Banks;" translation from the French of Dumont, of "Bentham's Theory of Legislation;" "Theory of Morals;" "History of the United States;" "Theory of Politics;" "Japan as it Was, and as it Is;" "Atrocious Judges; or, Lives of Judges Infamous as Tools of Tyrants and Instruments of Oppression."

Elizabeth Margaret Chandler (1807-1834), Wilmington, Delaware; authoress of "The Slave Ship."

Henry Reed (1808-1854), Philadelphia; Professor of Rhetoric

and English Literature in the University of Pennsylvania; "Lectures on English Literature from Chaucer to Tennyson;" "Lectures on the British Poets;" "Lectures on English History and Tragic Poetry, as Illustrated by Shakespeare;" "Two Lectures on the History of the American Union.

William D. Gallagher (1808 ——), Philadelphia; poet; edited "Cincinnati Mirror;" connected with "Western Literary Journal and Monthly Review;" the "Western Monthly Magazine;" and the "Hesperian, a Monthly Miscellany of General Literature;" joint editor of the "Cincinnati Gazette;" published poems under the title of "Erato;" and edited "Selections from the Poetical Literature of the West."

George Stillman Hillard (1808-1871), Machias, Me., lawyer, orator and poet; published several orations; "Six Months in Italy;" a series of "Class Readers;" an edition of "Spenser." His "Life of Captain John Smith" is in the "Library of American Biography."

John Greeenleaf Whittier (1808——), Haverhill, Mass.; "poet of freedom and humanity, known and loved in both hemispheres;" "Ballads of New England;" "Bay of Seven Islands;" "Child Life;" "Hazel Blossoms;" "In War Time;" "King's Missive and other Poems;" "Pennsylvania Pilgrim;" "Snow-Bound;" "Songs of Labor;" "Songs of Three Centuries;" "Seat on the Beach;" also "Old Portraits and Modern Sketches," a series of prose essays on Bunyan, Baxter, etc.

Oliver Wendell Holmes (1809 ——), Cambridge, Mass.; physician, poet, man of letters; brilliant, profound, witty, pathetic, keen-eyed, sympathetic, it would be difficult to find in literature a man with such a happy combination of enviable qualities as Wendell Holmes. He is a charming writer of that difficult form of verse called *vers de societé*; and indeed recalls Mackworth Praed, who is admittedly monarch in that domain; his "Autocrat of the Breakfast-Table" is as happy as its title. There are but two men, ripe in years, living to-day who compare with each other in a green and glorious intellectual old age, and these

are the American Oliver Wendell Holmes and Scotch ex-Professor John Stuart Blackie.

Edgar Allen Poe (1811-1849), Baltimore, Va.; a gifted and deplored son of genius; his unhappy failing has been written of and all his foolishness hashed up, and rehashed to very weariness; his tales are weird fascinating creations; "The Raven" every one knows, and some of his other poems are full of liquid music.

Charles Sumner (1811-1874), Boston, scholar, jurist, statesman and philanthropist; "Sumner's Reports" are well known to the legal profession and his "Oration on the True Grandeur of Nations" is famous; his "Speeches, Addresses and Literary Essays" are published.

Harriet Beecher Stowe (1812 ——), Litchfield, Conn.; first publication, "Uncle Lot;" "The Mayflower" published in 1849, was a collection of tales and essays; "Uncle Tom's Cabin" was published in numbers and was written with almost miraculous speed, amid other duties, family cares and ill-health; in 1852 it appeared in book form and had unexampled success; a million copies were sold in England in that year, before the end of 1852 it had been translated into Italian, Spanish, Danish, Swedish, Dutch, Flemish, German, Polish and Magyar; other works of this gifted lady are "Sunny Memories of Foreign Lands;" "Dred, or a Tale of the Dismal Swamp;" and "The Minister's Wooing."

Henry Theodore Tuckerman (1813-1871), Boston; poet and essayist; "Artists' Life, or Sketches of American Painters;" "The Italian Sketch-book;" "The Optimist," a collection of essays; "Rambles and Reveries;" "Sicily, a Pilgrimage;" "Thoughts on the Poets;" "Characteristics of Literature;" he also contributed to many prominent serials.

Henry Ward Beecher (1813-1887), Litchfield, Conn.; a preacher and lecturer of the highest eminence; "Lectures to Young Men;" "Star Papers, or Experiences of Art and Nature," etc.

John Lothrop Motley (1814-1877), Dorchester, Mass.; eminent historian, author of "The Rise of the Dutch Republic."

Rufus Wilmot Griswold (1815-1857), Benson, Vermont; man of letters; famous for his "Poets and Poetry of America;" "The Prose Writers of America;" and "The Female Poets of America."

Philip Pendleton Cooke (1816-1850), Martinsburg, Va.; lawyer; author of "Froissart Ballads and other Poems."

John Godfrey Saxe (1816-1887), Highgate, Vermont; "the witty poet;" "Progress, a Satire;" "Rape of the Lock;" "Proud Miss McBride;" etc., etc.

A. Cleveland Coxe (1818 ——), Mendham, N. J.; bishop; chief publications, "Athanasion;" "Miscellaneous Poems;" "Christian Ballads;" he has written many valuable articles for various serials in this country and in England.

James Russell Lowell (1819 ——), Cambridge, Mass.; distinguished poet and essayist; author of "Legend of Brittany;" "Prometheus" and "Miscellaneous Poems and Sonnets;" "Conversations on Some of the Old Poets;" "A Fable for Critics;" "The Biglow Papers."

Josiah Gilbert Holland (1819 ——), Belcherton, Mass.; editor; the author of "Timothy Titcomb's Letters;" "The Bay Path," a novel; "Bitter Sweet," a pastoral poem; etc., etc.

George H. Boker (1824 ——), Philadelphia; man of letters; author of "The Lesson of Life and Other Poems;" "Calaynos, a Tragedy;" "Anne Boleyn, a Tragedy," etc., etc.

Sarah Jane Lippincott (1823 ——), Pompey, N. Y.; "Grace Greenwood," wrote for the *New York Mirror*, "Ariadne;" "The Horseback Ride;" "Pygmalion," editor of "The Ladies Book;" published "Greenwood Leaves;" "Poems;" "History of My Pets;" "Haps and Mishaps of a Tour in Europe;" "Merrie England," for children; "A Forest Tragedy and Other Tales;" "Stories and Legends of History and Travel."

George William Curtis (1824 ——), Providence, R. I.; man of letters; "Nile Notes of a Howadji;" "The Howadji in

Syria;" "Lotus Eating, a Summer Book;" "The Potiphar Papers."

Richard Henry Stoddard (1825 ——), Hingham, Mass.; poet; contributor to various magazines; published "Footprints;" "Poems;" "Adventures in Fairyland;" "Songs of Summer;" "Book of the East."

Bayard Taylor (1825–1878), Kennet Square, Penn.; poet; "Home Pastorals and Ballads;" "Lars, a Pastoral;" "Poems of Home and Travel;" "Poems of the Orient;" "Essays and Literary Notes," "A Journey to Central Africa;" "The Lands of the Saracens," and "India, China and Japan."

Louis Jean Rudolph Agassiz (1807–1873), Switzerland; naturalist; author of "Natural History of Fresh Water Fishes of Central Europe;" "Études sur les Glaciers;" "Geological Sketches;" "Structure of Animal Life;" "Journey in Brazil," etc.

Samuel Austin Allibone, born (Prussia) 1816; literary lexicog- ar. Best known by his "Critical Dictionary of English Literature," and "British and American Authors."

William Taylor Adams, "Oliver Optic," born (Massachusetts) 1822; author of many popular juvenile works.

Charles Godfrey Leland, born (Pennsylvania) 1824; poet; author of the "Hans Breitmann Ballads," etc., and of several prose works, among which are "The English Gypsies and Their Language;" "Origin of the Gypsies." His best poem is "The Music Lesson of Confucius."

Mrs. Sarah Payson Parton, "Fanny Fern," (Maine 1811–1872), sister to N. P. Willis, essayist and novelist; author "Ruth Hall;" "Fern Leaves;" "Folly as It Flies," etc. Wife of

James Parton, born (England) 1822 ——, biographer. A prolific writer. Author of attractive biographies of Greeley, Aaron Burr, Andrew Jackson, Benjamin Franklin, Jefferson, "Famous Americans," and "Voltaire," which is considered his most important work.

Francis Winthrop Palfrey, born (Massachusetts) 1831, (son of John G. Palfrey, historian). Author of "Antietam and Fredericksburgh," in Scribner's "Campaigns of the Civil War;" memoir "William Francis Bartlett," etc.

Sarah Hamond Palfrey, born (Massachusetts) 1833, (sister of F. W. Palfrey). "E. Foxton." Novelist and poet. Author of the novels "Katharine Morne" and "Herman," and several volumes of poems.

Stephen Collins Foster (1826–1864), Pennsylvania. Song writer. Author "Suwanee River" "My Old Kentucky Home," "Nelly Bly," etc.

Mrs. Rosa Griffith Jeffrey, born (Mississippi) 1826. Novelist and poet. Author of "Woodburn," "Florence Vale," "The Crimson Hand," and poems.

George Brinton McClellan, born (Pennsylvania) 1826. Author of "The Armies of Europe," "Organization and Campaigns of the Army of the Potomac," etc.

Francis Miles Finch, born (New York) 1827. Poet. Author of the well-known poem, "The Blue and the Gray."

Charles Elliot Norton, born (Massachusetts) 1827. Author of "Historical Studies of Church Building in the Middle Ages," "Notes of Travel and Study in Italy," etc., and translator of Dante's "Vita Nuova."

William James Rolfe, born (Massachusetts) 1827. Shakespearean scholar. Editor of an annotated edition of "Shakespeare" in forty volumes, and of Craik's "English of Shakespeare," co-author with J. H. Hanson, of several classical text-books, and with J. A. Gillet, of the "Cambridge Physics."

Mrs. S. Rochester Ford, born (Kentucky) 1828. Novelist. Author "Grace Truman," "Romance of Freemasonry," "Raids and Romance of Morgan and His Men," etc.

William Alexander Hammond, born (Maryland) 1828. Physician. Author "Military Hygiene," "Physiological Essays," "Sleep and Its Derangements," "Nervous Derangements," etc.

Hiram Corson, born (Pennsylvania) 1828. Chaucerian and

early English scholar. Editor of Chaucer's "Legende of Goode Women," and author of "A Thesaurus of Early English," a valuable handbook of Anglo-Saxon and early English.

William James Stillman, born (New York) 1828. Littérateur and artist. Author "History Cretan Insurrection," "Poetic Localities of Cambridge," etc.

Theodore Winthrop (1828–1861), Connecticut. Novelist. Author of "John Brent," "Cecil Dreeme," "Edwin Brothertoft," "Canoe and Saddle," "Love on Skates," etc.

Lewis Wallace, born (Indiana) 1828. Novelist. Author of the "Fair God: An Aztec Story," and "Ben Hur: A Tale of the Christ."

Charles Graham Halpine, "Miles O'Reilly," (1829–1868), Ireland. Poet. Author of poems, "Miles O'Reilly Papers," etc.

Mrs. Martha J. R. Lamb, born 1829, (Massachusetts). Historian. Editor "Magazine of American History," "History of the City of New York," etc.

Guy Humphrey McMaster, born (New York) 1829. Poet. Author of a lyric entitled "Carmen Bellicosum."

Charles Dudley Warner, born (Massachusetts) 1829. Humorist. Author "My Summer in a Garden;" "Back-log Studies;" "Baddeck;" "Saunterings;" "Being a Boy;" "Baddeck and That Sort of Thing;" "Mummies and Moslems;" "Adirondack Essays," etc.

Mrs. Margaret Hosmer, born (Pennsylvania) 1830. Novelist and writer of Sunday-school tales. Author "Blanche Gilroy;" "Chinaman in California," etc.

Mrs. Helen Jackson, "H. H," born (Massachusetts) 1830. Poetess and littérateur. "Tides," "October," and "Poppies on the Wheat," are some of her finest poems. "Bits of Travel," "Bits of Talk," and "A Century of Dishonor," are her principal prose works.

S. Weir Mitchell, born (Pennsylvania) 1829. Author of several valuable professional works, the novels "Hephzibah Guinness," and "In War Time," "The Hill of Stones," and other poems, etc.

Luigi Monti, born (Sicily) 1830; littérateur; author "An American Consul Abroad;" "Leone," a novel, etc. He appears in Longfellow's "Tales of a Wayside Inn" as "The Young Sicilian."

Chauncey Wright, (Massachusetts) 1830–1875; philosopher; author Philosophical Discussions."

Mrs. Jane G. Austin, born (Massachusetts) 1831; novelist; author of "Shadow of Moloch Mountain;" "Mrs. Beauchamp Brown;" "The Desmond Hundred;" "A Nameless Nobleman;" two volumes of "Fairy Tales;" "Nantucket Scraps," etc.

Charles Nordhoff, born (Prussia 1830); littérateur; author of "Cape Cod" and "All Along Shore," "California," "Politics for Young Americans," etc.

Josiah Phillips Quincy, born (Massachusetts) 1830; poet and littérateur; author "The Protection of Majorities," and other papers, etc.

Benjamin F. De Costa, born (Massachusetts) 1831; historical writer; author of "The Pre-Columbian Discovery of America," "The Northmen in Maine," etc., and editor "History P. E. Church," etc.

Ignatius Donnelly (Pennsylvania) 1831; author "Essay on the Sonnets of Shakespeare," "Atlantis: The Antediluvian World," and "Ragnarok: The Age of Fire and Gravel."

Paul Hamilton Hayne, born (S. Carolina) 1831; lyric poet; author of "Legends and Lyrics," sonnets and other poems, etc.

Mrs. Mary Virginia [Hawes] Terhune, "Marion Harland," born (Virginia) 1833; novelist. Author of "Alone," "Moss-Side," Beechdale," "Common Sense in the Household," etc.

Mrs. Metta Victoria [Fuller] Victor, born (Pennsylvania) 1831; novelist and poetess. "Maum Guinea," "Jo. Daviess's Client" and the "Dead Letter" are the best of her numerous stories. "Compound Interest" one of her best poems.

Andrew Dickson White, born (New York) 1832; historical

writer; president Cornell University; author "The Warfare of Science," "Lectures on Modern History."

Louisa May Alcott, born (Pennsylvania) 1832; author of "Moods," "Little Women," "Little Men," "An Old Fashioned Girl," "Eight Cousins," "Under the Lilacs," etc.

Mrs. Elizabeth Ann Allen, "Florence Percy," born (Maine) 1832; poetess, best known by her poem "Rock Me to Sleep, Mother."

Hubert Howe Bancroft, born (Ohio) 1832; historian; author of "The Native Races of the Pacific States," "History of the Pacific States," and "The Early American Chroniclers."

John Bascom, born (New York) 1832; philosopher; president Wisconsin University; author of "Psychology," "Æthetics," "Political Economy," "Science, Philosophy and Religion," "Natural Theology," "The Science of Mind," "The Words of Christ," etc.

James De Mille (New Brunswick) 1833–1880; humorous novelist; author of the "Cryptogram," "The American Baron," "Comedy of Terrors," "The Dodge Club," "The Lady of the Ice," "The B. O. W. C.," a series of Boys' Books, etc.

Edmund Clarence Stedman, born (Connecticut) 1833; poet and critic; author "Alice of Monmouth;" "The Blameless Prince;" etc. Among his finest poems are "Pan in Wall Street," and "The Lord's-Day Gale." "His Victorian Poets" is a work of much value, as an example of dispassionate, conscientious and skillful literary judgment.

George E. Waring, born (Connecticut) 1833; sanitarian; author "The Sanitary Drainage of Houses and Towns;" "A Farmer's Vacation;" "The Bride of the Rhine;" "Tyrol and the Skirt of the Alps;" "Village Improvements, and Farm Village," etc.

Wm. Adolphus Wheeler, (1833-1874); lexicographer; editor "Webster's Dictionary," and author "Noted Names of Fiction;" "Familiar Allusions," etc.

Charles Farrar Browne, "Artemus Ward" (1834-1867); humorist; author " Artemus Ward, his Book;" "Artemus Ward Among the Mormons;" "Artemus Ward in London," etc.

Robert Green Ingersoll, born (New York), 1833; freethinker; author of several works attacking Christianity.

Richard Realf, (1834-1878); poet. "Indirection" and "Nil Nisi Bonum," are among his most striking poems.

Frederick Louis Ritter, born (France) 1834, writer on music; author "Music in England;" "Music in America;" "History of Music in the form of Lectures;" and "Student's History of Music."

David Swing, born (Ohio) 1830; Presbyterian theologian; author of "Sermons," "Club Essays," "Truths for To-day," "Motives of Life," etc. A fearless leader of liberal thought in his adopted city, Chicago, Ill.

Wm. Swinton, born (Scotland) 1834; philologist and military historian; author of "Rambles Among Wórds," "Twelve Decisive Battles of the War," "Campaigns of the Army of the Potomac," a clear, able narrative, and numerous educational text-books.

Lyman Abbott, born (Massachusetts) 1835; religious writer; editor of "Christian Union;" author of "Jesus of Nazareth," "Old Testament Shadows of New Testament Truths," "Illustrated Commentary on the New Testament," "A Layman's Story," etc.

L. Clarke Davis, born (Maryland) 1835; novelist, essayist and miscellaneous writer; editor "Philadelphia Inquirer; author "The Stranded Ship," etc.

Edward Greey, born (England) 1835; littérateur; author of the plays "Vendome and Mirah;" the novel, "Blue Jackets," several works relating to Japan; "The Golden Lotus," "Young Americans in Japan," "The Wonderful City of Tokio," "The Bear Worshippers of Yezo," etc., and one of the translators of the Japanese romance, "The Loyal Ronius."

John James Piatt, born (Ohio) 1835; poet; author of

"Landmarks," "Western Windows," "Poems of House and Home," etc. His finest poem, "The Morning Street," is graceful and poetic.

Mrs. Celia (Leighton) Thaxter, born (New Hampshire) 1835; poetess; author of "Drift Weed," "Poems," "Poems for Children," and a prose volume, "Among the Isles of Shoals," "Courage," "Kittery Church Yard," "The Spaniards' Graves," and the "Watch of Boon Island" are some of her finest poems.

Moses Coit Tyler, born (Connecticut) 1835; literary historian; author of "The Brownville Papers," etc., and a "History of American Literature;" in two volumes.

Thomas Bailey Aldrich, born (New Hampshire) 1836; poet and novelist; author of the novels "Prudence Palfrey,' "The Queen of Sheba," and "The Still-Water Tragedy," "The Story of a Bad Boy," a volume of sketches containing the famous "Marjorie Daw," etc. Among his finest poems are "Spring in New England," "Baby Bell," and the "XII Sonnets."

Wm. L. Alden, born (Massachusetts) 1837; humorist; author of "Domestic Explosions," "Shooting Stars," "Moral Pirates," "Cruise of the Canoe Club," "Life of Christopher Columbus," etc.

Arthur Gilman, born (Illinois) 1837; Chaucerian editor; author of "First Steps in English Literature," "Seven Historic Ages," "First Steps in English History," "History of the American People," etc.

Francis Bret Harte, born (New York) 1837; poet and novelist; author of the novel, "Gabriel Conroy;" the play, "Two Men of Sandy Bar;" "East and West Poems," "Echoes of the Foot Hills," and the volumes of short stories, entitled "The Luck of Roaring Camp," "Drift from Two Shores," "Tales of the Argonauts," "Thankful Blossom," "The Story of a Mine," "Flip and Found at Blazing Star," "Twins of Table Mountain," "Mrs. Skaggs' Husbands," and condensed novels. "Dowe's Flat," "Her Letter," and "A Newport Romance," are among his best poems.

Wm. Dean Howells, born (Ohio) 1837; poet and novelist; author of "Poems," "Venetian Life," "Italian Journeys," "Suburban Sketches," "Their Wedding Journey," "A Foregone Conclusion," "The Lady of the Aroostock," "The Undiscovered Country, "A Modern Instance," "A Woman's Reason," etc., and the comedies, "Out of the Question," "A Counterfeit Presentment," "The Parlor Car," "The Sleeping Car," etc.

Mrs. Harriet Elizabeth (Prescott) Spofford, born (Maine) 1835; novelist and poetess; author of "Azarian," "Sir Rohan's Ghost," etc. The "Amber Gods" is her most characteristic story.

Mary Abigail Dodge, "GailHamilton," born (Massachusetts) 1838; miscellaneous writer. Her chief works are "A New Atmosphere," "Gala Days," "Woman's Wrongs," "Red Letter Days," "Summer Rest," "Battle of the Books," "Twelve Miles from a Lemon," "Sermons to the Clergy," "First Love is Best," and "What Think ye of Christ?"

Henry George, born (Pennsylvania) 1839; political economist; author of "Progress and Poverty," etc.

John Hay, born (Illinois) 1839; poet; author of "Pike County Ballads," and other poems, and "Castillian Days." Of his dialect poems, "Jim Bludsoe" and "Little Breeches" are best known.

James Ryder Randall, born (Maryland) 1839; lyric poet; author of the famous song, "Maryland, my Maryland."

John Torrey Morse, Jr., born (Massachusetts) 1840; author of "J. Q. Adams and Thos. Jefferson" in American Statesmen, "Life of Alexander Hamilton," "Banks and Banking," "Arbitration and Award," "Famous Trials," etc.

Eugene Schuyler, born (New York) 1840; historical writer; author of "Peter the Great as Ruler and Reformer," "Turkistan," etc.

Edward Abbott, born (Maine) 1841; editor Literary World; author of "Paragraph History United States," "Paragraph History American Revolution, "Revolutionary Times," etc.

Wm. Graham Sumner, born (New Jersey) 1840; political economist; author of "History American Currency," "What Social Classes Owe to Each Other," "Problems in Political Economy," etc.

George Alfred Townsend, born (Delaware) 1841; journalist; author of "Bohemian Days," "Campaigns of a Non-Combatant," "The Entailed Hat," Poems, etc.

John Fiske, born (Connecticut), 1842; philosopher; author of "Myths and Myth Makers;" "Outlines of Cosmic Philosophy;" "The Unseen World;" "Darwinism and Other Essays;" "Tobacco and Alcohol;" "Excursions of an Evolutionist;" etc.

Mrs. Hattie [Tyng] Grisworld, born (Massachusetts), 1842; poetess; author of "Apple Bloosoms;" "Under the Daisies;" etc.

John Habberton, born (Long Island), 1842; littérateur; author of "Other People's Children;" "The Barton Experiment;" etc. His most noted book is "Helen's Babies."

Henry James, Jr., born (New York), 1843; novelist and critic; author of the novels "Roderick Hudson;" "The American;" "The Europeans;" "Confidence;" "Washington Square;" and "The Portrait of a Lady;" the novelettes, "The Pension Beaurepas;" "Daisy Miller;" "An International Episode;" etc. "A Passionate Pilgrim and Other Tales;" "Transatlantic Sketches;" "French Poets and Novelists;" "Portraits of Places," and "Hawthorne in English Men of Letters."

Reginald Heber Newton, born (Pennsylvania), 1840; Broad church theologian; author of "Womanhood;" "The Morals of Trade;" "The Right and Wrong Uses of the Bible;" "The Book of Beginings;" etc.

Bartley Campbell, born (Pennsylvania), 1843; dramatist, author of "My Partner;" "The Galley Slave;" "Matrimony;" "Siberia;" and other popular plays.

Elizabeth Stuart Phelps, born (Massachusetts), 1844; novelist and poetess; author of "Gates Ajar;" "Hedged In;" "The Silent Partner;" "Sealed Orders;" "Men, Women and Ghosts;"

"Friends, a Duet;" "Dr. Zay;" "Beyond the Gates;" "Poetic Studies;" etc.

Maurice Thompson, born (Indiana) 1844. Novelist and Poet; author of "A Tallahassee Girl;" "His Second Campaign;" "Hoosier Mosaics;" a volume of sketches, "The Witchery of Archery;" and songs of "Fair Weather."

Julian Hawthorne, born (Massachusetts) 1846. Author of "Bressant;" "Garth;" "Dust;" "Idolatry;" "Fortune's Fool;" "Beatrix Randolph;" "Saxon Studies;" etc.

Edgar Fawcett, born (New York) 1847. Poet and Novelist; author "Poems of Fantasy and Passion;" the novels, "A Gentleman of Leisure;" "A Hopeless Case;" "An Ambitious Woman;" etc.

George Washington Cable, born (Louisiana) 1845. Novelist; author "Old Creole Days;" "The Grandissimes;" "Madame Delphine;" "Dr. Sevier;" "Simms in American Men of Letters;" etc.

UNIVERSITIES AND COLLEGES.

University education preceded the erection of colleges, which were munificent foundations to relieve the students from the expense of living at lodging-houses and inns. Collegiate or academic degrees were first conferred at the University of Paris in 1140 A.D., some authorities say not before 1215. The most ancient universities in Europe were those of Bologna, Oxford, Cambridge, Paris, and Salamanca. The Scotch universities, which are as democratic in their constitution and atmosphere as the English are aristocratic, are those of St. Andrew's, Glasgow, Aberdeen and Edinburgh. These colleges are now non-resident. They have turned out numberless famous men who sprang from the ranks of the people.

In the United States the first college established was at Cambridge, Mass., in 1638. It was endowed by John Harvard, and bears his name. It is now the most liberally endowed institution of learning in the United States. The second was William

and Mary, at Williamsburg, Virginia, founded in 1693; the third, Yale, New Haven, 1700; the fourth the College of New Jersey, at Princeton, N. J., 1746; King's (now Columbia) at New York, 1754; University of Pennsylvania, Philadelphia, 1785; Brown University, Providence, 1764; Dartmouth, at Hanover, N. H., 1769; Rutgerst, New Brunswick, N. J., 1770. The first medical school was established at Philadelphia in 1764.

In the report of the United States commissioner of education for 1883-4, the number of institutions classed as universities and colleges is reported as 370, with 4,644 instructors and an enrollment of 65,522 students. Their total income from productive funds was $3,096,025, and from tuition fees $2,159,550.

In addition to those named above the most important colleges, with the dates of their founding, are as follows: Wesleyan, Middleton, Conn., 1830; John Hopkins, Baltimore, Md., 1876; Amherst, Amherst, Mass., 1821; Williams, Williamstown, Mass., 1793; University of Michigan, Ann Arbor, 1841; Dickinson, Carlisle, Pa., 1783; Washington and Lee, Lexington, Va., 1749; University of Virginia, Charlottesville, 1825; Cornell University, Ithaca, N. Y., 1868; Union, Schenectady, N. Y., 1795; Bowdoin, Brunswick, Me., 1798; Trinity, Hartford, Conn., 1823; University of California, Oakland, Cal., 1855.

EDUCATION IN SCHOOLS.

In consequence partly to the former existence of slavery and the constant influx of immigrants into the states there is still a great mass of people totally ignorant. The census of 1880 places the population above ten years of age at 36,761,607. Of that number 4,923,431, or 13.4 per cent were unable to read; and 6,239,958 or 17 per cent were unable to write. Whites who could not write were 9.4 per cent, and of these the percentage of native whites was 8.7 against foreign 12. Of the colored population in the south 70 per cent could not write. In Iowa the per centage of illiterates was 2.4; in Nebraska 2.5; in Wyoming 2.6. The greatest proportion of illiterates was furnished by

South Carolina, where 48.2 could not read; Louisiana 45.8; Georgia 42.8. In the western states and territories illiteracy was comparatively low. California 7.1 and Nevada 7.3, stood with two exceptions the highest, Arizona gave 16.7 and New Mexico 60.2. In these last, and especially in New Mexico, a large proportion of the population is of Mexican descent, and a large number of Pueblo and Moquis Indians are included in the population.

In the school year of 1883-4 the population of school age (which varies from 4-21 to 8-16) was reported as 16,744,402 of whom 10,738,192 were enrolled and 6,693,925 were in daily attendance at common schools.

The general government makes no direct appropriation of moneys for the support of the common schools, all it does being to set aside for each state, upon its admission into the Union, a certain part of the public domain, which, according to the constitution of most of the states, forms a part of the permanent school fund, the income of which is used for the support of the common schools. This income is supplemented by the amounts received from direct taxation in each state.

In 1883-4 the amount reported for common-school purposes was \$113,402,630, and the amount expended \$106,614,900.

Seminaries and academies (private) in 1883-4 numbered 1,588, with 152,354 scholars and 7,923 instructors.

ILLITERACY IN VARIOUS COUNTRIES.

Calling the percentage of illiteracy in the United States 14 per cent, the proportion in other countries who cannot read or write is 92 per cent in India; 90 per cent, Russia; 90 per cent, Mexico; 45 per cent, Ireland; 30 per cent, England; 28 per cent, France; 11 per cent, Germany; 9 per cent, Japan, and 7 per cent Bavaria. (Some authorities quote China at 45 per cent, others at 23 per cent.)

CHAPTER XXVIII.

ENGLISH LITERATURE.

THE traveler who gazes from an eminence on the bird's-eye view which it affords, of a newly-visited city or locality, is glad to have his attention directed to the principal objects of interest in the somewhat confusing expanse around him, and readers of these pages will probably be better able to retain an impression on their mental vision of what follows, with the aid of a few general observations on some of the chief points concerning which it at once creates a desire for fuller information. The gift of language enabled mankind from the earliest ages to communicate their thoughts and ideas to each other; and, long before the invention of writing, songs were composed by the bards or priests, to be recited in their religious ceremonies, or to kindle courage in battle, which were orally handed down from generation to generation, and formed the main source of all subsequent historical records and other literature.

It must also be remembered, in connection with the rise and progress of English learning, that, for centuries prior to the Christian era, intellectual culture had attained its highest development in ancient Greece and Rome, and that, from the writings of the celebrated authors of those days, whose works were almost miraculously preserved during the dark ages, which followed the downfall of the Roman Empire, all that is most valuable in our secular knowledge and literature, except a fuller acquaintance with the laws of nature, has been mediately or immediately derived. English literature owes an immense debt to Italy in

this respect, but Italy of the renaissance owed the revival of letters to the classics of Greece and Rome.

The Angles are supposed to have brought with them to Britain, in the fifth century, a composition in praise of the deeds of their ancestors, called "The Gleman's Song," which, with two others entitled "The Battle of Fonsburgh," and "The Tale of Beowulf," was afterwards committed to writing, and these constitute the only specimens of their language and poetry. Caedmon was a native of Britain, and heads the roll of Anglo-Saxon writers. Bede, and several of his successors, wrote in Latin, because that language was adopted by the monks as better suited than the rude vernacular for literary purposes. King Alfred, however, endeavored to instruct his people by means of translations, but his example does not seem to have been followed, the writers during the next two centuries having chiefly devoted themselves to historical annals and controversial theology. The earliest dawn of romance was the engrafting into their works, by Mapes and others, of Welsh legends, relating to King Arthur. The first work on English law appeared soon afterwards, and Roger Bacon's treatises on science and general knowledge. Satire and criticism followed next, and the Anglo-Saxon language, which was gradually changing into Norman-English, began to be used more generally than Latin.

During the fourteenth century vice and misery were depicted in allegorical poetry, and the spirit of inquiry was stimulated by travels and philosophical disquisitions. Wycliffe's translation of the Bible helped, at the same time, to enforce the doctrines of the religious reformers, and Chaucer's poetry awakened an interest in human character and daily life. With Chaucer, indeed, in any popular sense we may say that English poetry really begins. He stands out clear and bright on the horizon of English literature, and has been aptly and beautifully called the "morning star," as he has been termed the "Father of English poetry." The wars of the Roses caused a decadence of literature during the fifteenth century; but a revival ensued, and

translations from the classics, as well as sonnets and love songs imitated from Italian poetry, considerably expanded the range of thought, and imparted a more elegant tone to the language. Miracle plays, representing scriptural events, which had been originated on the continent of Europe, early in the Christian era, and went on developing until this time, were succeeded by moral plays, or "moralities," and these both were eventually superseded by comedies and tragedies, whilst romances in prose and verse became popular.

In the sixteenth century the diffusion of knowledge by means of the printing-press gave an astonishing impetus to literature; the effect of the reformation was to relieve the human mind from bondage, and to give that sense of freedom which is essential to the creations of genius; the discovery of new countries, and the discoveries of science kindled the imagination of men; and, generally, the intellectual ideas of the nation were enlarged. The Elizabethan era was a marvelous one: an age of miracle in every direction. In literature it stands distinctly preëminent. The Elizabethan drama, culminating in Shakespeare, has never been excelled in grandeur and variety, in perfect delineations of human nature, in wealth of incident and exuberance of wit. If Shakespeare may be compared to a lofty mountain peak towering high above a host of others, which cluster around, their summits high above the clouds, we can as aptly figure the verse of Spenser as flowing like a majestic river in the broad valley below, where a thousand other streams meander in pellucid loveliness. Never was such an age of charming song. The prose compositions, in almost every branch of learning, attained a depth of tone, and a classic grace of style, which have served as models to subsequent writers. Lord Verulam — Francis Bacon — was one of the greatest men of genius the world has ever seen. No one has ever doubted his transcendant ability in science and philosophy. He considered all knowledge to be his province, and he excelled in every department of it. His character, long and foully aspersed, has, after more than two centuries, been

amply vindicated, and he stands now before the world a monument of all that is personally worthy and admirable, as in scholarship and genius he was preëminently great. This magnificent period does not embrace Milton, and yet we may well name him in the same breath with those who preceded him. In his "Paradise Lost" he seems to write almost with the authority of "Inspiration." He has so influenced the minds of men of succeeding ages that they can hardly sometimes distinguish between his conceptions and what is given us in Holy Writ. It is rather of the Adam and Eve of Milton that we naturally think than of the Adam and Eve of Genesis.

The civil war of the seventeenth century again almost silenced the voice of literature, with the exception of polemical treaties, and Puritanical rule suppressed the drama. The Restoration witnessed a tremendous reaction consequent on Puritan severity and the dissolute manners of the court of Charles II. The dramatic writers of the time borrowed largely from Spanish sources, and the drama of intrigue came into existence. It is sufficient to say of it that no writer of any note, with the strange exception of Charles Lamb, has ever had a word to say in mitigation of its utter and vulgar beastliness. The last twenty years of the sixteenth century and the first thirty years of the seventeenth run into each other as a literary period. Milton belongs to the seventeenth century, and in his own province the greatest man not only of his own time, but of any time; also is of this century — John Bunyan.

During the first half of the eighteenth century, which is known as the "Augustan" age of English literature, the poetical compositions, although perfect in meter, were deficient in passion and grace. The style of the chief prose writers, however, was simple and vigorous. In the next generation several of the noblest specimens of English writing were produced, and the poetry became more fervid and natural. Works of fiction took the place of tragedies and comedies, while history, science and philosophy were more generally studied and popularized.

The newspaper press and periodical criticism became from this time powerful influences in guiding public opinion, and satire the keenest weapon for assailing the vices both of the rich and the poor. The stirring incidents of the first French revolution gave birth to an entirely new development of mental activity, which is still perceptible in the greater freedom of thought and in the widened scope of the literature of the present century. More practical than that of any preceding age, it at the same time indicates an intellectual energy, and, excepting the effusions of sensational novelists, a moral pureness which should earn for many of the writers, including some now living, an enduring fame in the estimation of posterity.

At the present time in our own community there is an especial stir in the direction of an acquaintance with English literature. It is an addition to its desirability as a mode of refinement and culture in society, insisted on at every educational test and competitive examination. It will, in the coming generation, be as indispensable as a knowledge of spelling and grammar. The following synopsis of the names of the most celebrated poets and prose writers, with the date of their death, their social position, and the titles of their principal works, may prove useful, not only to students but to all who are anxious to acquire a general idea of the gradual expansion of thought and development of literary talent up to recent years.

Caedmon (died 680). The earliest known Anglo-Saxon whose works are preserved, was a monk at Whitley, and wrote "A Paraphrase" in verse from the Bible, selecting the most vivid and picturesque incidents as his themes.

Bede (died 735). Named *The Venerable*, the father of English learning, spent his life in a monastery at Jarrow, where he obtained great repute as a scholár and teacher. He wrote in Latin "A Treatise on The Nature of Things," and "A Church History of the English Nation."

Alcuin (died 804). Was a school-master at York, and, after a journey to Rome, resided for some years at the court of Char-

lemagne. He was the author of several works in Latin, on theology, history, mathematics, poetry and rhetoric.

Joannes Scotus Erigena (died 875). Was a native of Ireland, and the greatest philosopher of the dark ages. He wrote a treatise on "Natural Science," several theological commentaries, and some poetry.

King Alfred, The Great (died 901). Was taught by his mother, and translated the works of several Latin writers for the instruction of his subjects. He is also supposed to have originated the first "Anglo-Saxon Chronicles."

Aelfric (died 1005). A monk, and afterwards Archbishop of Canterbury, wrote "Homilies" on the doctrine of the Anglo-Saxon church, and made translations from the Old Testament.

William of Malmesbury (died 1143). An Oxford priest; wrote "A History of the Early Kings and Prelates of England" in Latin, and other works.

Geoffrey of Monmouth (died 1154). Bishop of St. Asaph; compiled "A History of Britain," based upon older records and Welsh Legends, which became very popular.

Layamon (died 1190). A Worcestershire priest; was the author of a metrical "History of the Colonization of Britain," named "The Brut," which is valuable as a specimen of the transition from Anglo-Saxon to Early English.

Ranulf De Glanville (died 1190). Chief Justice of Henry II; compiled the earliest "Treaties on The Laws and Customs of England."

Walter Mapes (died 1210). Archdeacon of Oxford; wrote "The Poem of Golias," a satire on the clergy, "Court Anecdotes," containing sketches of the manners of his time, and contributions to "The Romances of King Arthur," whose exploits were sung by the Welsh bards and became the theme for many mediæval and modern poems.

Alexander of Hales (died 1245). A friar; was the author of an exhaustive "Theological Treatise," which was adopted in all the school of Christendom.

Matthew Paris (died 1259). A monk of St. Alban's; wrote "A History of the World" from the Creation, which included a record of events in his own lifetime, and is considered a very valuable work.

Roger Bacon (died 1292), a Franciscan monk; devoted himself to chemical, physical and mathematical science. His great work is his "Opus Majus," the encyclopedia of the thirteenth century. He was also acquainted with astronomy and geography and several ancient languages.

Robert of Gloucester (died 1299), a monk; composed a rhyming "Chronicle of English History," consisting of more than ten thousand lines in the vernacular language of his time.

John Duns Scotus (died 1308), a professor at Oxford; was an eminent scholar, and earned the name of the "subtle Doctor." He wrote "Commentaries" on theological and philosophical questions.

Nicholas Trivet (died 1328), a Dominican monk; was the author of a well-written and trustworthy series of "Historical Annals," embracing a period of nearly two centuries.

Robert Manning (died 1338), a Lincolnshire monk; was the author of a rhyming "Historical Chronicle" in quaint early English, evincing considerable poetical power.

William of Occam (died 1347), a Franciscan monk; earned great reputation as a scholar and philosopher. He wrote several "Theological Treatises," and supported the German Emperor in his controversies with the Pope.

Wm. Landland (died 1360), an Oxford fellow; was the author of an allegorical poem entitled, "The Vision of Piers Plowman," in which he satirizes the corruptions of the Church, and depicts various types of human character. The metre is alliterative, several words in each line commencing with the same letter.

Ranulf Higden (died 1367), a Benedictine monk; wrote "A Chronicle," in Latin, called "Polychronicon," a translation of which by Trevisa, was afterwards completed and printed by Caxton.

Sir John Mandeville (died 1372), a physician; was the author of one of the earliest known works in English prose, consisting of a narrative of his "Travels in the East," during the peoiod of 34 years.

John of Fordun (died 1384), a priest at Aberdeen, Scotland; wrote "A Chronicle of Scotland" from the time of Noah.

John Wicliffe (died 1384), Rector of Lutterworth; wrote treatises against the errors of Papacy, and made the first complete "Translation of the English Bible."

John Barbour (died 1395), Archdeacon of Aberdeen, was the first Scotch poet who used the English language. He wrote "The Bruce," a chronicle of the career of the famous king of that name.

Geoffrey Chaucer (died 1400), a courtier; established his fame as the first great English poet by his "Canterbury Tales," a vivid picture of society in the fourteenth century.

John Gomer (died 1408), a lawyer; exposed the vices of all classes in two poems, entitled "The Voice of One Crying," and "The Confessions of a Lover."

John Lydgate (died 1430), a Benedictine monk, was a scholar and a poet. His three chief works are "Troy Book," "The Story of Thebes," imitated from Chaucer's "Fall of Princes;" and "London Lickpenny," a satire.

King James I. of Scotland (died 1436), while a prisoner in Windsor Castle, England, composed a poem entitled "The King's Quhair" (book), in praise of the lady whom he afterwards married.

Reginald Pecock (died 1450), Bishop of Chichester, was one of the first advocates for liberty of thought on unessential religious doctrines.

Sir John Fortesque (died 1485), Chief Justice to Henry VI.; wrote a learned treatise on "The Common Law of England."

Robert Henryson (died 1495), a Scottish poet; was the author of "The Testament of Cresseid," a metrical translation of Æsop's Fables, and some ballads.

John Colet (died 1519), Dean of St. Paul's; was a zealous promoter of the revival of learning, and wrote several theological and classical treatises.

William Dunbar (died 1520), of St. Andrew's University, Scotland; commemorated the marriage of James IV. in a poem "The Thistle and the Rose," and wrote a satire named "The dance of the Seven Deadly Sins."

Gawin Douglas (died 1522), Bishop of Dunkeld, Scotland; produced the first translation of Virgil's Æneid.

Sir Thomas More (died 1535), Chancellor to Henry VIII.; wrote "Utopia," an imaginary form of government, in Latin, and some controversial tracts in elegant English.

William Tyndale (died 1536), a preacher to the English Factory at Antwerp; made "A Translation of the New Testament," and was the author of several theological treatises.

Sir William Wyatt (died 1542), a courtier; composed "Sonnets," imitated from Italian poetry, in more polished language than any previous writer.

Henry Howard, Earl of Surrey (died 1547), wrote elegant "Love Sonnets," and translated part of the Æneid in blank verse.

Alexander Barclay (died 1552), a Benedictine monk; was the translator of "The Ship of Fools," a celebrated German satire.

John Leland (died 1552), Chaplin to Henry VIII., and the first English Antiquary; wrote "An Itinerary" of his travels, and other works.

Sir David Lindsay (died 1555), a courtier (Scotland), was the author of "The Dream," and other satirical poems.

Hugh Latimer (died 1555), Bishop of Worcester; was celebrated for his quaint "Sermons in Favour of the Reformation."

Thomas Cranmer (died 1556), Archbishop of Canterbury; wrote several "Controversial Treatises."

John Bale (died 1563), Bishop of Ossary; wrote "Miracle Plays," and compiled a "Summary of British Authors" in Latin.

Nicholas Udall (died 1564), head master at Eton; composed the first English comedy, called "Ralph Roister Doister."

John Heywood (died 1565), a courtier; was the author of several dramatic "Interludes," and a large number of "Epigrams."

Roger Ascham (died 1568), public orator at Cambridge. Wrote a work on education entitled "The Schoolmaster," and was celebrated for his Latin compositions.

Miles Coverdale (died 1568), Bishop of Exeter; took part in "A Translation of the Bible," and wrote several works against the Roman Catholic doctrines.

George Gascoigne (died 1577); a law student; translated from Ariosto the first English prose comedy named "The Supposes." He was the author of "Steel Glas" and some other satires.

Sir Philip Sidney (died 1586); wrote a poem entitled "Arcadia," several sonnets in elegant English, and "The Defence of Poesy."

John Foxe (died 1587), an Oxford Fellow; was the author of "Moralities" in Latin, and "The Book of Martyrs," a manual of Protestantism.

Cristopher Marlowe (died 1593), a Cambridge graduate; "wrote Tamburlaine the Great," "Doctor Faustus," and several other dramatic works of great power.

Edmund Spenser (died 1599), a courtier; was the author of a celebrated allegorical poem, entitled "The Fairie Queen" and "A View of Ireland."

Richard Hooker (died 1600), Master of the Temple; is known for his work on "Ecclesiastical Polity," defending the Church of England against the dogmatism of the Presbyterians.

John Stow (died 1605), a tailor; was the author of a popular "Summary of English Chronicles," and "A Survey of London."

John Lyly (died 1606), a courtier; wrote "Euphues, or the Anatomy of Wit," and "Euphues and his England," as well as

several plays. He adopted an affected style which became fashionable and was termed "Euphuism."

Thomas Sackville, Earl of Dorset (died 1608); wrote several poems and assisted in the composition of the first English tragedy, called "Ferrex and Porrex or Gorboduc," founded on early British legends.

Francis Beaumont (1585–1615) and *John Fletcher* (died 1625) were the joint authors of more than fifty brilliant and romantic comedies and tragedies, passages from which are still frequently quoted.

William Shakespeare (1563–1616); commenced life as an actor, and wrote thirty-seven tragedies and comedies, which hold the highest place in English literature, and have obtained an unperishable fame in every civilized country.

Sir Walter Raleigh (died 1618); was the author of "A History of the World," and several short poems.

Samuel Daniel (died 1619), a courtier; composed a poem called "Musophilus," several odes and sonnets, "A History of England," and "A Defence of Rhyme." He was called "The Gentle Daniel."

William Camden (died 1623), head master of Westminster School; wrote a work of considerable merit in Latin entitled "Britannia," giving an account of the British Isles from the earliest ages.

Thomas Lodge (died 1625), a physician, wrote several dramas and Rosalinde, a novel, upon which Shakespeare founded his play of "As You Like it."

Francis Bacon, Lord Verulam (died 1626); wrote a series of philosophical and other treatises of great merit under the general title of "Instauratio Magna."

Michael Drayton (1563–1631), an Oxford graduate; was the author of "Polyolbion," a metrical guide book to England and Wales, "The Battle of Agincourt," and other historical poems, and "Nymphidia," a fairy tale.

Ben Jonson (died 1637), was originally an actor; he became

poet-laureate, and wrote "Every Man in His Humour," and several other plays, masques, and lyrical poems, full of vigor and fancy.

Rev. George Herbert (died 1632); wrote "The Country Parson," and some "Sacred Poems," which are still popular.

Edward Fairfax (died 1632), son of a baronet; translated Tasso's "Jerusalem Delivered," and wrote a treatise on "Demonology."

George Chapman (died 1634), an Oxford graduate; wrote "Eastward Ho!" a comedy depicting London life, and many other plays. He also translated Homer and Hesiod.

Rev. Robert Burton (died 1639); was the author of a well-known work, entitled "The Anatomy of Melancholy."

Philip Massinger (died 1640), who was educated at Oxford; wrote "The Virgin Martyr," and other plays, in purer taste than many of his contemporaries.

William Drummond (died 1649), an Edinburgh graduate; was the author of "A History of the Five Jameses," and numerous poems, sonnets and elegies.

John Selden (died 1654), M. P. for Oxford University; wrote "Titles of Honour," and other works of great merit on constitutional and legal questions.

Rev. Thomas Fuller (died 1661); wrote "The Worthies of England," "A Church History," and some other quaint and scholarly works.

Jeremy Taylor (died 1667), Bishop of Dawn; was a fluent theological writer, the title of his best works being "Ductor Dulutantium," "Holy Living," and "Holy Dying."

Sir William Davenant (died 1668), poet-laureate; was the author of a tragedy named "Albovine," several masques, and an epic poem entitled "Gondibert."

William Prynne (died 1669), a Puritan lawyer; wrote "Histrio Mastrix," a virulent pamphlet against the stage, and a number of political treatises.

John Milton (died 1674), the son of a scrivener; attained

the highest rank as a poet by his "Paradise Lost" and "Paradise Regained"; he wrote also "Comus," a masque; "Lycidas," an elegaic poem, and political and theological works.

Edward Hyde, Earl of Clarendon (died 1674); wrote "A History of the Rebellion," which contains some cleverly executed descriptive portraits.

Thomas Hobbes (died 1679), secretary to Lord Bacon; wrote several works on "The Science of Government," in a very republican spirit.

Samuel Butler (died 1680), the son of a farmer; was the author of "Hudibras," a celebrated satire against the Purita full of wit and learning.

Sir Thomas Browne (died 1682), a physician; wrote "Relgio Medici," and other works in a rich and impressive style, which gained him considerable reputation.

Izaak Walton (died 1683), a hosier; is known as the author of "The Complete Angler," and some biographies.

Thomas Otway (died 1685), an actor, wrote "Venice Preserved," and several other course but thrilling plays.

George Villiers "Duke of Buckingham," (died 1688), was the author of a comedy, entitled "The Rehearsal," and some other plays.

John Bunyan (died 1688), a tinker, wrote "The Pilgrim's Progress," a religious allegory, which has been translated into a greater number of languages than any other book except the Bible.

Richard Baxter (died 1691), a Puritan preacher; wrote "The Saints' Everlasting Rest," and many other theological treatises.

John Dryden (died 1700), poet-laureate to Charles II.; was the author of numerous plays, several controversial and satirical poems, including "Absalom and Ahithophel," and many other works in verse and prose. He also made translations from *Virgil*, and some other Greek and Latin poets. One of his best works is "An Ode to St. Cecilia's Day."

Samuel Pepys (died 1703), Secretary to the Admiralty; kept "A Diary," which affords amusing information as to the manners and customs of the age in which he lived.

John Locke (died 1704), a country gentleman; wrote "Letters on Toleration," "An Essay Concerning Human Understanding," and several treatises on civil government, education, and other subjects.

John Evelyn (died 1706), a member of the Royal Society; was the author of "Sylvia," a discourse on forest trees, several works on the "Fine Arts," and a "Diary," containing curious glimpses of society in the seventeenth century.

George Farquhar (died 1707), educated at Trinity College, Dublin; became an actor, and wrote "The Beaux Stratagem," and other plays.

Rev. Thomas Parnell (died 1717), was a contibutor to periodicals, and the author of a poem named "The Hermit."

Nicholas Rowe (died 1718), poet-laureate to George I.; was the author of "Jane Shore," and other plays.

Joseph Addison (died 1719), Secretary of State; was the principal contributor to "The Spectator," and also a dramatist and poet.

Matthew Prior (died 1721), a diplomatist; wrote "Henry and Emma," and other poems, several tales and some epigrams.

Rev. Jeremy Collier (died 1726), wrote an essay on the "Immorality and Profaneness of the Stage," and political pamphlets.

Sir Isaac Newton (died 1727), immortalized himself as the first demonstrator of "The Laws of Gravitation," and wrote numerous scientific and philosophical treatises.

Sir Richard Steele (died 1729), contributed to three periodicals; "The Tattler," "The Spectator," and "The Guardian," and was the author of several comedies, and political essays.

Daniel Defoe (died 1731), a merchant; was the first English novelist, and his "Robinson Crusoe," is still popular. He was also a satirical poet and a political writer.

John Gay (died 1732), a courtier; was the author of "The Beggar's Opera," and wrote comedies, farces and fables.

John Arbuthnot (died 1735), a physician; wrote a humorous "History of John Bull," and was joint author with Pope and Swift of a satirical essay, entitled "Martinus Scriblerus."

Alexander Pope (died 1744), the son of a linen draper; was the author of "An Essay on Man;" "The Dunciad," and many other critical and satirical poems; he also translated *Homer*.

Jonathan Swift (died 1745), Dean of St. Patrick's, Dublin; was the author of numerous compositions in verse and prose, in almost every style of literature. One of his best known works is "Gulliver's Travels."

James Thomson (died 1748), son of a Presbyterian minister; wrote a series of poems, called "The Seasons," and several tragedies.

Rev. Isaac Watts (died 1748), a dissenting minister; was the author of well-known hymns, amongst which are "The Busy Bee;" "The Sluggard," and many other hymns for children. He also wrote some theological and philosophical essays.

Joseph Butler (died 1752), Bishop of Bristol; was the author of "An Analogy of Religion;" and his "Sermons on Moral Philosophy" hold a high place in church literature.

Henry Fielding (died 1754), a law student; was the author of "Tom Jones," "Joseph Andrews," and other novels; he also wrote plays and political pamphlets.

William Collins (died 1756), the son of a hatter; was the author of "An Ode to the Passions," and some other poems.

Colley Cibber (died 1757), an actor and poet-laureate; wrote "The Careless Husband," and several other plays.

Allan Ramsay (1686-1758), apprenticed to a wig-maker, and afterwards a bookseller; wrote "The Gentle Shepherd;" "The Vision," and a collection of miscellaneous poems.

Samuel Richardson (died 1761), printer; was the author of "Clarissa Harlowe," "Sir Charles Grandison," and several other novels.

Lady Mary Wortley Montague (died 1762), wrote several poems, and described her "Travels in the East" in a series of letters which are still read with pleasure.

Rev. Edward Young (died 1765), was the author of "Night Thoughts," several satires and three tragedies.

Rev. Lawrence Sterne (died 1768), wrote two humorous narratives, entitled "Tristram Shandy," and "A Sentimental Journey," and some sermons and satires.

Thomas Chatterton (died 1770), the son of a sexton; composed "Legendary Histories," and miscellaneous poems; he died in his eighteenth year, unequalled by any poet of his age.

Mark Akenside (died 1770), a physician; wrote "The Pleasures of the Imagination," a poem of much merit.

Thomas Gray (died 1771), a professor at Cambridge; was the author of the famous "Elegy in a Country Church-yard," and several odes.

Tobias Smollett (died 1771), a naval surgeon; wrote "Roderick Random;" "Peregrine Pickle," and some other satirical novels.

Oliver Goldsmith (died 1774), a medical student; was the author of "The Vicar of Wakefield," several poems, a play entitled "She Stoops to Conquer," and some historical works.

David Hume (died 1776), compiled "A History of England," and wrote several political and philosophical treatises.

Samuel Johnson (died 1784), the son of a bookseller; compiled a "Dictionary," and wrote "The Lives of the Poets," a tragedy, a novel, and essays on various subjects.

Adam Smith (died 1790), a professor at Glasgow University; was the author of "The Wealth of Nations," a treatise on political economy.

Rev. John Wesley (died 1791), was the author of a "Journal;" a translation of "The Works of Thomas á Kempis," and some theological treatises.

Sir Joshua Reynolds (died 1792), a painter; wrote "Discourse on Painting," and "Remarks on Pictures of the Dutch and Flemish Schools."

Edward Gibbon (died 1794), the son of a country gentleman; devoted many years to a history of "The Decline and Fall of the Roman Empire," which has been translated into almost every European language.

James Boswell (died 1795), a Scotch country gentleman; was a companion of Dr. Johnson, and wrote his life.

James MacPherson (died 1796), a Scotch schoolmaster; wrote "Ossian."

Robert Burns (died 1796), the most famous of Scotch poets; wrote "The Cotter's Saturday Night;" "Tam O'Shanter;" "Auld Lang Syne," and many sentimental and patriotic songs, popular now all over the world.

Horace Walpole (died 1797), M. P.; was the author of a novel entitled, "The Castle of Otranto;" "Anecdotes of Painters," and several other works; he was also celebrated as a letter writer.

Edmund Burke (died 1797), M. P., for Wendover; wrote "Essays on the Sublime and the Beautiful." His fame rests chiefly on his eloquent speeches in Parliament.

William Cowper (died 1800), was the author of a poem, "The Task," as well as several other poems and moral satires; his is the "History of John Gilpin."

Rev. John Home (died 1808), a Scotch minister; was the author of the once popular tragedy "Douglas."

Charles Dibdin (died 1814), a musician; wrote "Poor Jack" and many other favorite ballads and sea songs.

Richard Brinsley Sheridan (died 1817), Under-secretary of State; wrote three of the wittiest farces in the English language: "The Rivals," "The School for Scandal," and "The Critic."

Sir Philip Francis (died 1818), is the reputed author of "Junius."

John Keats (died 1821), a medical student; wrote "Endymion," and an "Ode to a Nightingale," and many other elegant poems.

Percy Bysshe Shelley (died 1822), eldest son of a baronet; was

a gifted writer with extreme revolutionary ideas; his best poetical works are "Prometheus Unbound," and "Cenci;" his "Ode to a Skylark" is well known; he was also the author of several romances and translations from the Greek classics.

Lord Byron (died 1824), was a poet of extraordinary genius, power and versatility; his most popular works being "Childe Harold," and "Don Juan."

Sir Walter Scott (died 1832); was the prince of novelists, and the author of numerous romantic poems.

Samuel Taylor Coleridge (died 1834), the son of a clergyman; became a poet, a critic, and a metaphysician; his best works being "Christabel," "The Ancient Mariner," and "Aids to Reflection."

Charles Lamb (died 1834), a clerk in the India office; wrote "Essays of Elia," a clever series of humorous sketches, and "Tales from Shakespeare."

Robert Southey (died 1843), poet-laureate; was the author of "Thalaba;" "The Curse of Kehama;" "The Doctor," and other poems.

Thomas Campbell (died 1844), son of a merchant: established his fame as a poet by his "Pleasures of Hope."

Thomas Hood (died 1845), son of a bookseller; wrote "The Bridge of Sighs;" "The Song of a Shirt," and many other pathetic and humorous poems.

Rev. Richard H. Borham (died 1845); was the author of "The Ingoldsby Legends."

Lady Nairne (died 1845), was the authoress of "Caller Herrin;" "The Auld House" "The Laird o' Cockpen," and other popular lyrical poetry.

Isaac Disraeli (died 1848), son of a retired merchant; wrote "The Curiosities of Literature," and other works on the same subject.

Countess of Blessington (died 1849), wrote her "Conversations with Byron," and several novels, travels, sketches and memoirs.

Maria Edgeworth (died 1849), the daughter of a mechanical

engineer; was the authoress of "Belinda," and many other admirable tales of Irish life.

Hartley Coleridge (died 1849), an Oxford scholar; contributed to "Blackwood," and other magazines; he also wrote "The Lives of Northern Worthies," and "The Life of Massinger," a dramatist.

Captain Marryat (died 1849), R. N.; wrote "Midshipman Easy;" "Peter Simple;" "Jacob Faithful," and many other naval novels.

William Wordsworth (died 1850), poet-laureate; was the author of "The Excursion," and numerous other poems of great beauty.

Joanna Baillie (died 1851), the daughter of a Presbyterian minister; wrote a series of "Plays on the Passions," and some miscellaneous poetry.

Thomas Moore (died 1852), educated for the law; was the author of "Irish Melodies," "Lalla Rookh," and many other poems.

James Montgomery (died 1854), of humble origin; wrote "The Wanderer in Switzerland;" "The Grave," and other de scriptive and miscellaneous poetry.

Samuel Rogers (died 1855), a banker; wrote "The Pleasures of Memory," and other poems.

Henry Hallam (died 1859), an Oxford graduate; was the author of a "Constitutional History of England," and an "Introduction to the Literature of Europe," both of which evince great industry, acuteness, and impartiality.

Lord Macaulay (died 1859); wrote "The Lays of Ancient Rome;" a "History of England," and numerous other essays and poems; he also contributed to several periodicals, and for brilliancy of style and elegant diction holds the highest rank among English writers.

Thomas de Quincey (died 1859), the son of a merchant; was the author of "Confessions of an Opium Eater," and an impassioned and critical writer in several periodicals.

J. H. Leigh Hunt (died 1859), the son of a solicitor; was a journalist, poet and essayist; he is best known as the editor of the *London Journal.*

General Sir William Napier (died 1860); wrote a "History of the Peninsular War," and other works on India.

Mrs. Barrett Browning (died 1861); was the highly educated and talented authoress of "Seraphim;" "Aurora Leigh," and several other lyrical poems.

J. Sheridan Knowles (died 1·62), an actor; produced "The Hunchback," "Love Chase," and some other plays.

William Makepeace Thackeray (died 1863), the son of an Indian civil servant; contributed to "Punch," and several magazines, and earned great reputation as the author of "Vanity Fair," "Pendennis," and several other novels.

Mrs. Trollope (died 1863), was the authoress of "Travels in America," and numerous novels.

Richard Whately (died 1863), Archbishop of Dublin; wrote several valuable works on "Logic" and "Rhetoric."

Walter Savage Landor (died 1864), having squandered his estate, became an author, and wrote "Imaginary Conversations," which are full of scholarship and humor, as well as poems and essays.

Rev. John Keble (died 1865), was the author of "The Christian Year," and several other theological works.

Mrs. Gaskell (died 1865), the wife of a Unitarian minister, wrote "Mary Barton," and other novels depicting artisan life.

William Aytoun (died 1866), a graduate of Edinburgh; was the author of "The Execution of Montrose," and several other national lays and ballads.

Sir Archibald Alison (died 1869), devoted many years to the compilation of "A History of Europe," which has a world-wide popularity.

Michael Faraday (died 1867), of humble origin; attained great eminence as a lecturer and writer on chemistry and electricity."

Henry Brougham (died 1868), Lord Chancellor; achieved a great reputation as an orator, and was the author of "Lives of Men of Letters," and several works on theology, metaphysics and science.

William Carleton (died 1869), of humble origin; wrote "Traits and Stories of the Irish Peasantry," and other humorous and pathetic tales.

Charles Dickens (died 1870), the son of a civil servant; was the author of "The Pickwick Papers," and a series of popular novels, chiefly delineating the life of the masses.

Sir John Herschel (died 1871), wrote many treatises on astronomy and other scientific subjects.

Sir Roderick Murchison (died 1871); was president of the Geographical Society, and the author of several works on geology.

Henry Alford (died 1871), Dean of Canterbury; wrote "The School of the Heart," and other poems, and was an eminent Greek scholar.

Charles James Lever (died 1872), a physician; wrote "Harry Lorrequer," "Charles O'Malley," "Jack Hinton," and many other brilliantly humorous Irish novels.

Mrs. Somerville (died 1872); was the authoress of "The Connection of the Physical Sciences," "Physical Geography," and other popular scientific works.

John Stuart Mill, M.P. (died 1873); was the author of numerous works on political economy, with a strong democratic and agnostic bias.

Lord Lytton (died 1873); was a richly gifted and versatile writer of plays, romances and novels. "The Lady of Lyons" and "Money" are his best dramas, and "The Last Days of Pompeii" and "Eugene Aram" are his most popular fictions.

Rev. Charles Kingsley (died 1875); was the author of "Alton Locke," "Yeast," "Hypatia," and other novels, evincing strong sympathy with the working classes.

John Forster (died 1876), a barrister; was an eminent jour-

nalist, and the biographer of Swift, Dickens, and other men of note.

Harriet Martineau (died 1876), descended from a Huguenot family; was the authoress of "Illustrations of Political Economy," some historical works and travels, and biographical notices.

Samuel Warren (died 1877), a barrister; wrote "The Diary of a Late Physician," "Ten thousand a Year," and some other sensational novels.

William Hepworth Dixon (died 1879), a barrister; was the author of "New America," "Free Russia," "The Switzers," and other historical and biographical works.

George Eliot (Maria Evans, 1880), was the authoress of "Adam Bede," "Silas Marner," "Middlemarch," "Daniel Deronda," and other novels, evincing rare genius and knowledge of human nature.

Tom Taylor (died 1880), a civil servant, wrote "The Ticket of Leave," and other popular plays.

Thomas Carlyle (died 1881), the son of a Scotch farmer; was a stern censor of the age he lived in, a contributor to several magazines, and the author of "Sartor Resartus," and several historical and philosophical works.

Benjamin D'Israeli (died 1881), Earl of Beaconsfield; commenced his success as a novelist with "Vivian Grey," and crowned it with "Endymion."

William Harrison Ainsworth (died 1882), a journalist; wrote "Jack Sheppard," "The Tower of London," and some other popular novels.

Charles Darwin (died 1882), a graduate of Cambridge; became famous as a naturalist and physiologist, and was the author of "The Origin of the Species," "The Descent of Man," and other scientific works.

Anthony Trollope (died 1883), a civil servant; will be remembered as the author of "Dr. Thorne," "Framley Parsonage," "Barchester Towers," and many other amusing novels and books of travel.

Robert and William Chambers (1871-1883), the sons of a Scotch weaver; were the eminent publishers of the *Edinburgh Journal,* and the authors of a very complete "History of English Literature," and many educational works of great merit, and having an immense circulation.

John William Colenso (died 1883), Bishop of Natal; was the author of some useful "Mathematical" works, of "Commentaries on the Pentateuch and Book of Joshua," of great ability, but of questionable orthodoxy.

William Spottiswoode (died 1883), an Oxford scholar and printer to the Queen; wrote a treatise on the "Polarisation of Light," and various works on philosophy, astronomy, popular education and other subjects.

CITY OF JERUSALEM.

CHAPTER XXIX.

THE BIBLE—FOREIGN MISSIONS.

IRRESPECTIVE of its claims to be considered of Divine origin, the Bible has several peculiarities which render it a unique volume. Consisting of detached pieces, it yet presents a transcendent whole, so perfectly consistent in all its parts that these have ever been best interpreted by each other. It is a miscellany made up of sixty-six tracts, written by about forty different authors, the latest of whom is divided from the earliest by about two thousand years. The Bible as a title is not as many suppose, derived from *biblos*, nor does it signify *the Book* by way of eminence; but it directly comes from *biblia*, a Greek term first applied by Christians in the fifth century to the various writings which compose the Old and New Testament canons. This name first occurs on the pages of Chrysostom, who in one homily says: "Provide yourselves with *Biblia*, the medicine of the soul; but if you desire no other at least procure the *new*, the Epistles, the Acts and the Gospels."

The first Bible, indeed the very first book—printed at Mentz was in Latin, between the years 1450 and 1455. An Italian Bible was printed in 1471; a German, in 1466; a Dutch, in 1477; a Valencian, in 1478; a Bohemian, in 1475; and a French, in 1477. Tyndale's New Testament in English was not circulated until 1526; and the first English version of the whole Bible by Myles Coverdale is dated 1435. The English Bible which is in common use, generally called King James' Bible, was translated

more than two and a half centuries ago, and has ever since held its place as a model of excellence.

The following tribute to the English Bible is perhaps the most beautiful that ever was penned:

"Who will say that the uncommon beauty and marvelous English of the Protestant Bible is not one of the strongholds of christianity in this country? It lives on the ear like music that can never be forgotten, like the sound of church-bells, which the convert hardly knows how he can forego. Its intrinsic beauty pleads availingly with the man of letters and the scholar. Its felicities often seem to be almost things rather than mere words. It is a part of the national mind, and the anchor of national seriousness; nay, it is worshiped with a positive idolatry. The memory of the dead passes into it, the potent traditions of childhood are stereotyped in its phrases. The power of all the griefs and trials of a man is hidden beneath its words. It is the representative of his best moments, and all that there has been about him of soft, and gentle, and pure, and penitent, and good, speaks to him forever out of his English Bible. It is his sacred thing, which doubt has never dimmed and controversy has never soiled. It has been to him all along as the silent—but, oh, how intelligible!—voice of his guardian-angel, and in the length and breadth of the land there is not a Protestant with one spark of religiousness about him whose spiritual biography is not in his Saxon Bible."

FACTS ABOUT THE BIBLE.

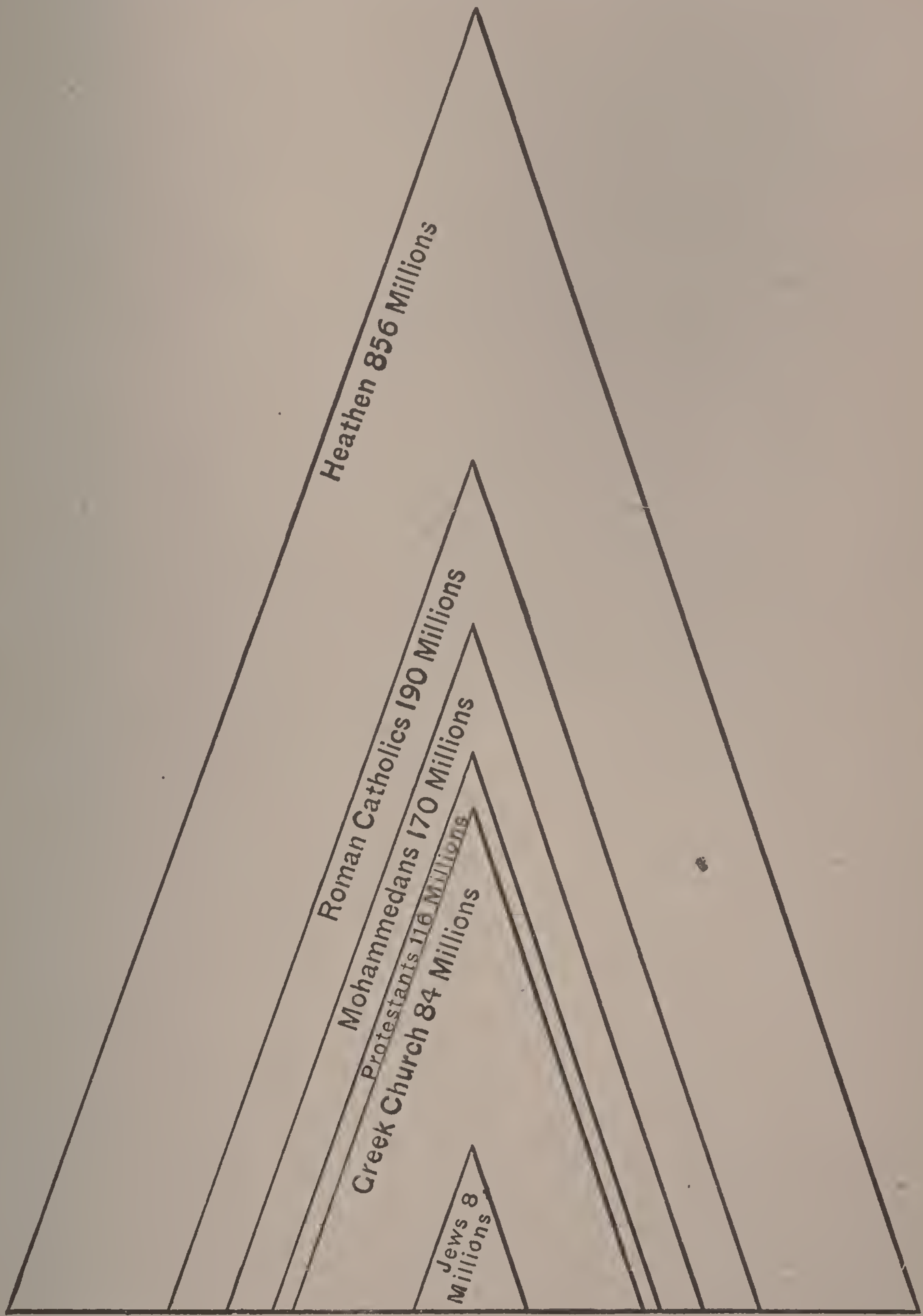
The Bible contains 3,586,489 letters, 773,692 words, 31,173 verses, 1,189 chapters, and 6 books. The word AND occurs 46,277 times. The word LORD occurs 1,855 times. The word REVEREND occurs but once, which is in the 9th verse of the 111th Psalm.

The middle verse is the 8th verse of the 118th Psalm. The 21st verse of the 7th chapter of Ezra contains all the letters of the alphabet except the letter J. The finest chapter to read is the 26th chapter of the Acts of the Apostles. The 19th chap-

Comparative Diagram Showing The

ACTUAL AND RELATIVE NUMBERS OF MANKIND

CLASSIFIED ACCORDING TO THEIR RELIGION.



ter of 2d Kings and the 37th chapter of Isaiah are alike. The longest verse is the 9th verse of the 8th chapter of Esther. The shortest verse is the 35th verse of the 11th chapter of St. John. The 8th, 15th, 21st and 31st verses of the 107th Psalm are alike. Each verse of the 136th Psalm ends alike. There are no words or names of more than six syllables.

FOREIGN MISSIONS.

Do you say you do not believe in foreign missions? Then there are certain things which you cannot believe: you cannot believe that God so loved the world that He sent His Son to save it; or that it is His wish that none should perish, but that all should come to repentance. You deny God's universal love. You cannot believe that the gospel is the power of God unto salvation to every one that believeth. You deny its efficiency. You cannot believe that He was the son of God, or has any claim to your obedience, who said "Go ye into all the world and preach the gospel to every creature." You deny His authority. For it is clear as noonday that if you believe these things, then you must believe in foreign missions.

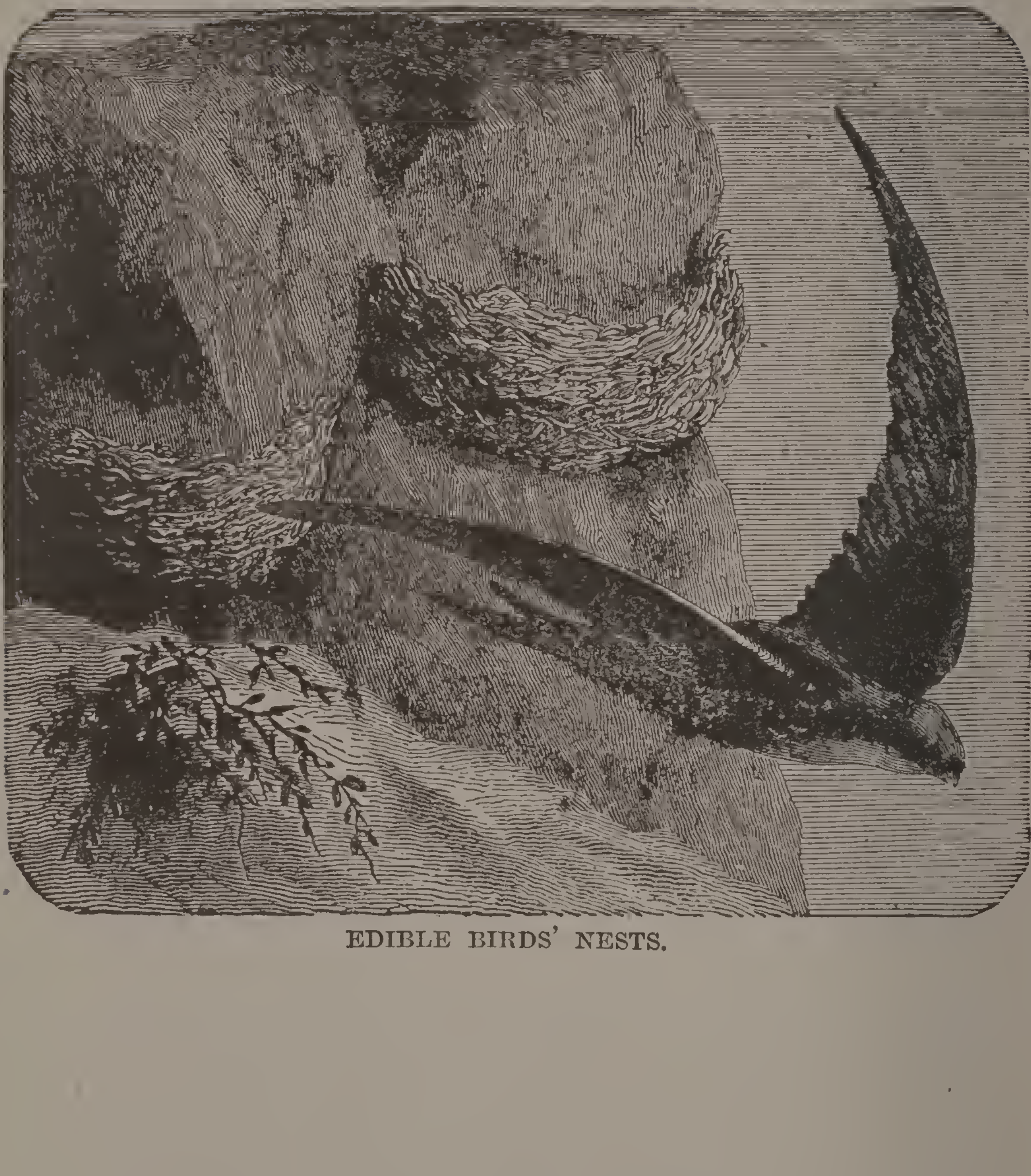
Unless you find in the gospel something which makes it worthy of being preached to all men, you have not found in it that which makes it of any worth to you; you have missed its meaning; you do not know its power. The root of unbelief in foreign missions is want of faith in the gospel. The following figures give the actual and relative numbers of mankind classified according to their religion:

Protestants, 116 millions; Greek church, 84 millions; Roman Catholics, 190 millions; Jews, 8 millions; Mohammedans, 170 millions; Heathen, 856 millions.

Of the Mohammedans, 80 millions are women confined in Moslem harems. Of the heathen, 300 millions are Buddhist women with no hope of immortality, unless in some future transmigration they may be born as men. Two hundred and fifty millions of women depend for the gospel upon the women of the Protestant churches of America. Nine-tenths of the contribu-

tions to the foreign missions are given by one-tenth of the church membership, while only one-half of the membership give anything. The average amount per member is fifty cents per annum—only the seventh part of a cent per day for the conversion of a thousand millions of heathen! An average of five cents a week from every member of the Protestant churches of the United States would bring into the treasury during a single year $16,500,000. Ninety-eight per cent of the churches' contributions for religious purposes is spent at home, while only two per cent is applied to the foreign mission field. There are 75,000 ministers in the United States, or one to every 600 persons, while only one is allotted to half a million in heathen lands. There are 1,500 counties in China without a single missionary.

The whole world is now open for the reception of the gospel. The Bible is printed in 250 languages and dialects; there are 150,000,000 copies in circulation. Twenty-five Woman's Boards in England and America are actively engaged in foreign missionary work. Thé Young Men's Christian Associations are now formally inaugurating Foreign Missionary Branches. The number of missionary societies is ten fold what it was eighty years ago; the number of converts is nearly fifty fold. Wonderful revivals, with pentecostal power, are frequent in heathen lands. The increase in membership in heathen lands is thirty times greater than at home in proportion to the number of ministers employed, although the tests of discipleship are of the most trying nature. But above all other encouragements are the precious promises of God: "Ye that are the Lord's remembrancers keep not silence and give him no rest till he establish and till he make Jerusalem a praise in the earth."—Isa. 62: 6 and 7. The great desire should be to awaken the people of God to the unparalleled opportunities of our own age, and the need of a movement more deep and wide, more earnest and self-denying, more bold and aggressive, than anything that has yet been attempted, to reach the neglected at home and evangelize the mighty generations abroad—the one thousand million souls who are dying in Christless despair at the rate of 100,000 a day.



EDIBLE BIRDS' NESTS.

CHAPTER XXX.

MISCELLANY.

BIRDS' NESTS AS FOOD.

LONG ago, in the records of natural history lore, it was known that the Chinese made a soup of certain birds' nests imported by them from the Eastern Archipelago. About 1817 Sir Everard Home suggested that the nutrient properties of the nests were due to some secretion or material derived from the stomach of the birds. The edible nests are made by species of swifts, and the special form which furnishes the well-known product is the *Collocalia nidifica* of naturalists. Here, however, as in so many other cases, we find that these curious nests do not stand alone in the zoological domain. Darwin, amassing, as was his wont, every fact of natural history, tells us that the nest is formed largely by the saliva or mouth-secretion of the bird. It is known that a North American swift uses its saliva in nest manufacture. It fixes and binds the sticks of which the nest is built with the secretion in question. In Darwin's view and in that of other authorities, the edible birds' nests were merely the work of a species, which, at the nest-building season, developed a special power of utilizing the saliva as a kind of plastic material. Opposed to these opinions we find views which maintain that the nests of the Eastern Archipelago are really formed of *Algæ*, or lower plants. The birds are believed to take these plants from the walls of the caves in which they dwell during the time of nest building. The plant-matter forms the basis in this view of

things, and the saliva constitutes the connecting medium whereby the solid parts are bound together to form the nest. Mr. Layard tells us, indeed, that the nests vary in structure, according to the period or season at which they are constructed. Those built early in the nest-building time consist almost entirely of animal secretion. Later on the birds appear to use extraneous matters, and employ foreign materials in the construction of their homes.

SOME FACTS ABOUT CHICAGO.

Chicago is distinguished for her grain market. There are in this city huge structures 150 feet high, towering above surrounding objects like feudal castles above the hovels of yeomen. Railroad trains run in and out of these Goliaths, and big steamers shelter their black hulks within the shadows while their holds are being filled with the golden grain. No other city in the world has so many elevators, no other such storage capacity; no other handles such vast quantities of cereals. In these structures may be housed more than 26,000,000 bushels of grain, equal to a solid column 100 feet square and 3,200 feet high, or to the average wheat crop of any one of the great wheat-growing states, California alone excepted. From out of the fertile West might come an impossible freight train composed of 42,000 box cars all laden with wheat, and, with their locomotives reaching more than half way from Chicago to Omaha, and these mighty receptacles could swallow up all the grain, and still cry for more. One elevator could alone contain almost the entire wheat crop of the state of New Jersey, or of all New England, with that of little Delaware thrown in for good measure. Two-sevenths of all the wheat and one-half of all the flour exported from the United States in 1884 were shipped from Chicago. Naturally enough, the grain quotations made in Chicago are virtually the quotations for the world. Two hundred thousand cars of grain arrived in Chicago last year—equal, with their engines, to a solid train 1,325 miles long. Next to her grain business, Chicago is famous for her slaughter houses. As a

sticker of pigs and killer of beeves she leads the world. In this kind of bloodshed she has no rival. More than 4,000,000 hogs and 1,000,000 beeves meet their fate here every year. Annually Chicago ships to the hungry of this country and the Old World something like 125,000,000 pounds of fresh beef, 40,000,000 of salt beef, 50,000,000 of pork, 360,000,000 of bacon and hams, and 250,000,000 of lard. What would the world's hungry do without Chicago?

Thirty years ago the daily receipts of strawberries in the city —now the second greatest fruit market in the world—could all have been carried in on one wagon at one load, and it would not have been a large load either. Now whole railway trains are engaged to carry the daily supply of that market, which often amounts to 300 tons, and sometimes twice that quantity.

FATE OF THE APOSTLES.

The following brief history of the fate of the Apostles may be new to those whose reading has not been evangelical:

St. Matthew is supposed to have suffered martyrdom or was slain with a sword at the city of Ethiopia.

St. Mark was dragged through the streets of Alexandria in Egypt, till he expired.

St. Luke was hanged upon an olive tree in Greece.

St. John was put into a caldron of boiling oil at Rome, and escaped death. He afterwards died a natural death at Ephesus in Asia.

St. James the Great was beheaded at Jerusalem.

St. James the Less was thrown from a pinnacle or wing of the temple, and then beaten to death with a fuller's club.

St. Philip was hanged up against a pillar at Hierapolis, a city of Phrygia.

St. Bartholomew was flayed alive by the command of a barbarous king.

St. Andrew was bound to a cross, whence he preached unto the people till he expired.

St. Thomas was run through the body with a lance at Coromandel in the East Indies.

St. Jude was shot to death with arrows.

St. Simon Zealot was crucified in Persia.

St. Matthias was first stoned and then beheaded.

St. Barnabas was stoned to death by the Jews at Salania.

St. Paul was beheaded at Rome by the tyrant Nero.

LARGE SALARIES.

There are a score of men in New York who are paid as much for their services each year as the President of the United States. Forty thousand dollars a year is a very tidy salary. There are hundreds of men who get $25,000 a year salary, and the number who get from $10,000 to $20,000 are legion. Very ordinary men get from $5,000 to $8,000 a year, or as much as a cabinet officer. Dr. Norvin Green, president of the Western Union Telegraph Company, is paid $50,000. So is Chauncey M. Depew, president of the New York Central Railroad. Richard M. McCurdy, president of the Mutual Life Insurance Company, gets a like amount. John Hoey, president of Adams Express Company, fares equally as well. President Henry B. Hyde, of the Equitable Life Insurance Company, is also on the list. George G. Williams, president of the Chemical National bank, the richest banking institution in America, with nearly $5,000,000 of surplus, $20,000,000 average deposits, is paid a salary of $25,000 yearly. President Potts, of the Park bank, and President Tappan, of the Gallatin National bank, receive a like sum each twelve months. The best paid minister in New York is Dr. John Hall, a brainy man from the north of Ireland, who preaches to $200,000,000 every Sunday. His is the smallest church in town. He owes his rise in life to Robert Bonner, of the *Ledger*, who found him preaching to a small congregation in Dublin, and induced him to come to America. He gets a salary of $20,000 a year, and makes $5,000 by his newspaper and magazine articles. He is given a luxuriously furnished

house as well. Dr. Morgan Dix, the chief pastor of Trinity church corporation, the wealthiest in America, receives $15,000 yearly. Dr. William L. Taylor, of the Broadway tabernacle, gets the same amount. He does literary work and lecturing that brings his income up to $20,000. Dr. Charles Hall, of the Fifth Avenue Presbyterian church, is paid $15,000. He is very eloquent and his church is crowded at all services. Dr. Parkhurst, of Madison Square church, gets $12,000. He has a large and distinguished congregation. Cyrus W. Field is one of the pillars of the church. Dr. Paxton, who preaches to Jay Gould and others less wealthy, is paid $15,000. The Rev. Robert Collyer, the blacksmith preacher, is paid $10,000.

GREAT MINDS.

> "Great genius is to madness near allied,
> And thin partitions do their bounds divide."

Cæsar and Peter the Great had falling sickness. Napoleon was subject to long fits of fainting that resembled catalepsy. Newton had also a disordered nervous system. Byron's mother was a raging, irresponsible termagant, and father no better. Isabella the Catholic, who was certainly a woman of genius, had a mad uncle, a mad brother, and mad daughter, the ancestor of all the Spanish and Austrian Hapsburgs. Her (Isabella's) grandson, Charles V., also a man of prodigious political genius, was epileptic and the progenitor of a line which ended in idiocy. Pascal had fits and hallucinations. Luther also had the latter and thought he saw the Devil in person coming to tempt him. William the Conqueror was the son of Robert the Devil, who must have had, to judge from the legend which has been handed down, a nervous system that ran riot. According to the new theory, genius, like the orchard pear or apple tree, or the double rose, or dahlia, is abnormal, and except in an intellectual sense, sterile. Thus Dante (a hypochondriac), Michael Angelo, Raphael, Shakespeare, Cowper, Wordsworth, Byron, Scott and De Quincey either left no posterity or families that soon died out. Victor Hugo had, on the maternal side, a mad uncle and

mad cousins. His brother Eugene died in a mad-house, and his only surviving daughter, Adele, has been for years in confinement.

PRECOCIOUS AUTHORS.

Mozart was exhibited as a pianist before he was five, and Mendelssohn's first cantata was written at eleven; while Beethoven at nine had outgrown his father's musical teaching; Raphael was a scholar in the studio at twelve; Titian painted a Madonna at the same age; Morland was an accepted portrait painter, highly paid by his customers at ten; Landseer exhibited his pictures at thirteen; and Flaxman carved busts at fifteen. Goldoni at eight sketched out a comedy; Calderon wrote a play at fourteen; Goethe was a poet at fifteen; Beaumont composed tragedies at twelve; and Cowley's epic, written at ten, is said to be "an astonishing feat of imaginative precocity." Scott invented stories at twelve; Dickens was a charming raconteur, the delight of his companions, at nine; and Charlotte Bronte wrote stories, as well as poems and plays, at fourteen. Grotius was a scholar at twelve; Porson could repeat the whole of Horace and Virgil before he was fifteen; and Macaulay at eight put together a compendium of universal history. Newton was a mechanician at school; Laplace, while a mere lad, was a mathematical teacher; Pascal at eighteen invented a calculating machine; and Leibnitz thought out difficult philosophic problems before he was fifteen.

NIAGARA'S GREAT FORCE.

The average flow of the Niagara River is 275,000 cubic feet per second, and its total calculated force equal to seven millions horse-power. According to the last United States census, the whole amount of power employed in manufacturing throughout the Union is about three millions and a-half horse-power, of which, roughly speaking, one-third is supplied by water and the remaining two-thirds by steam. It appears, therefore, that the water-power of the Niagara is enough to drive all the machinery in the United States twice told.

THE AMAZON.

The Amazon and its tributaries drain nearly 2,500,000 square miles, or more than a third part of South America, including about one-fourth of the area of Brazil, and has a course through the empire of nearly 2,300 miles. It is one of the wonderful rivers of the globe. It empties itself into the ocean with such velocity that navigators, after losing sight of the land, may yet drink its waters, its volume overlying—so it is said—the surface of the ocean for fifty leagues from shore. Beyond the frontier of Brazil the Amazon continues to be navigable by steamers for upwards of 1,188 miles, in the territory of Peru. The river and its tributaries are navigable, by steamers, through an aggregate length of more than 25,000 miles, and by smaller craft for double that distance. The river is altogether about 4,000 miles in length, is more than 150 miles at its mouths, and far into the interior is so broad that its navigation is often dangerous on account of the tempests which overtake vessels before they can reach the shore.

COLORADO.

Colorado has 800 miles of first-class irrigating canals, 3,500 miles of secondary canals and 40,000 miles of smaller ditches, which have cost in the aggregate about $11,000,000, and will irrigate 2,200,000 acres. The largest canal is taken from the Rio del Norte. It is 98 feet wide at the top and 65 feet at the bottom, with a carrying capacity of 207,000,000 cubic feet per diem. The main line is fifty miles long and it is designed to irrigate 200,000 acres. It was constructed in four months by 5,000 men and 1,200 teams.

A GREAT MOUNTAIN.

The great African Equatorial mountain, within 180 miles of the coast, opposite Zanzibar, collectively called Kilimanjaro, consists of two grand peaks—the one, called Kibo, rising to an elevation of 18,800 feet; the other Kimawenzi, rising to 16,250 feet. Both peaks have their summits above the region of eternal snow, and both are the craters of extinct volcanoes.

This country has an area of between 300,000 and 400,000 square miles of known coal fields, from which 100,000 tons is mined yearly—enough to belt the earth at the equator with a ring five and a half feet thick by five and a half wide. The quantity "in sight" is estimated to be sufficient to supply the whole world for a period of fifteen hundred to two thousand years.

ABOUT WIND AND WEATHER.

Seamen find it convenient to express many important facts in rhymes, and a few of the more prominent are here given.

The evening grey and the morning red,
Put on your hat or you'll wet your head.

When the wind shifts against the sun,
Trust it not, for it will run.

When the sun sets in the clear
An easterly wind you need not fear.

The evening red and morning grey
Are sure signs of a fine day;
But the evening grey and morning red
Make the sailor shake his head.

Adverting to the barometer:—

First rise, after low,
Indicates a stronger blow.

Also

Long foretold, long last:
Short notice, soon past.

To which may be added—

In squalls,
When the rain's before the wind,
Halyards, sheets, and braces mind.

And

When the wind's before the rain,
Soon you may make sail again.

Also, speaking generally—

When the glass falls low
Prepare for a blow.
When it rises high
Let all your kites fly.

"A rainbow in the morning,
Sailors take warning;
A rainbow at night
Is the sailor's delight."

EXTREMES OF WEATHER IN THE PAST.

Captain W. H. Gardner has examined, for the Alabama Weather Service, the records of the weather— such as exist—from 1701 to 1885, and concludes from them that spells of severe weather of all kinds—extreme heat and cold, violent storms, hurricanes and tornadoes, disastrous floods, and parching droughts—were no more rare in the last century and the earlier part of the present century than now. In 1701 there were recorded at Biloxi, Mississippi, a winter cold that instantly froze water poured into a tumbler, and August heat that made labor impossible except for two hours in the morning and two in the evening. In the winter of 1746 water was frozen solid in the houses at Charleston, South Carolina. In 1748 and 1768 the Mississippi river at New Orleans was frozen from thirty to forty feet from the shores. In 1823 skating was possible on all the standing water in and around Mobile. In 1827-28 the ground at Alabama, Georgia and South Carolina, was frozen hard from December till March. A flood in the lower Mississippi, and a "fearful hurricane" on the Gulf coast were recorded in 1723; another destructive hurricane in 1732; and overflows of the lower Mississippi from January till June, 1735; after which came a long drouth, and a lower river than had ever been known. In a hurricane at Dauphin Island, in September, 1740, a four-pound cannon was moved by the wind to eighteen feet from where it had been lying. Other hurricanes of extreme fury were recorded in October, 1788; August, 1779; August, 1780; and August, 1781. In the last year the Mississippi at New Orleans, the Attakapas, and the Opelousas, were higher than ever before known. The Mississippi at St.

Louis was equally high in the flood of 1785, and in July, 1884, and it reached its highest recorded flood in 1844. The flood of the Ohio river in 1832 was not exceeded till 1883. The year 1840 was one of almost continual drouth in Alabama and Mississippi, and prayer-meetings were held in view of the apprehended famine. These are only a few of the instances of remarkable phenomena, comparable to those that now attract attention, of which mention is made in Captain Gardner's record.

KNOWLEDGE AND IGNORANCE.

There are two sorts of ignorance. We philosophize to escape ignorance, and the consummation of our philosophy is ignorance. We start from the one, we repose in the other; they are the goals from which and to which we tend; and the pursuit of knowledge is but a course between two ignorances, as human life is itself only a wayfaring from grave to grave. We never can emerge from ignorance. If, as living creatures—

> "We are such stuff
> As dreams are made of, and our little life
> Is rounded with a sleep,"

so as cognizant intelligences our dream of knowledge is a little light rounded with a darkness. One mortal, one nation or generation of mortals, may flare a flambeau, and another twinkle a taper; still the sphere of human enlightenment is at best a point, compared with the boundless universe of night surrounding it. Science is a drop; nescience is the ocean in which that drop is whelmed.

OUR PRESIDENTS' GRAVES.

The burial-places of our presidents are widely scattered. Washington lies at Mount Vernon; the two Adamses are buried under the old church at Quincy, Mass.; Jefferson rests at Monticello; Madison's grave is at Montpelier, not far from Monticello; Monroe's remains lie in the Richmond cemetery; Jackson's grave is in front of his old residence, "The Hermitage;" Van Buren was buried at Kinderhook; Harrison at North Bend, near Cincinnati; Polk at Nashville; Taylor's remains are near Louis-

ville; Fillmore lies in Forest Lawn cemetery, Buffalo; Pierce was buried in Concord, and Buchanan at Lancaster; Lincoln's grave is near Springfield; Johnson's at Greenville; Garfield's at Cleveland; Grant's at Riverside, and Arthur's at Albany.

IMPORTANT FACTS ABOUT THE UNITED STATES.

The United States contains more English-speaking people than all the rest of the world; the wealth of the republic exceeds that of Great Britain; it also surpasses the mother country not only in agriculture but in manufactures, and for every pauper in the United States there are twenty-one in Holland and Belgium, and six in Great Britain and Ireland; seven-eighths of our people are native born; twenty-two per cent of them now live in towns of 8,000 or more inhabitants; if the live stock in our country were marshaled in procession five abreast, in close order, the line would reach round the world and overlap; Chicago alone makes half as many steel rails in a year as Great Britain, and Minneapolis turns out so much flour that the barrels would form a bridge from New York to Ireland; we produce sixteen pounds of butter annually for every man, woman and child in the country, and if our crop of cereals were loaded in carts, it would require all the horses in Europe, and a million more, to move it; more yards of carpeting are manufactured in Philadelphia than in all Great Britain; a single factory in Massachusetts turns out as many pairs of boots as 35,000 bootmakers in Paris; our Government has given us more land for the support of schools and colleges than the entire area of England, Scotland and Ireland.

THE WORLD'S ANNUAL INCREASE IN WEALTH.

The annual increase in the production of wealth is as follows:

United States	$825,000,000
France	375,000,000
Great Britain	325,000,000
Germany	200,000,000
Other countries	725,000,000
The world	$2,450,000,000

The average for America is $15 a head; for the rest of mankind $1.42 only. The entire wealth of the United States is estimated at $43,642,000,000. In 1860, omitting slaves, it was $16,157,000,000.

FAMOUS PICTURED ROCKS.

The famous Pictured Rocks on the Evansville pike about four miles from Morgantown, W. Va., have been a source of wonder and speculation for more than a century, and have attracted much attention among the learned men of this country and Europe. The cliff upon which these drawings exist is of considerable size, and within a short distance of the highway above mentioned. The rock is a white sandstone, which wears little from exposure to the weather, and upon its smooth surface are delineated the outlines of at least fifty species of animals, birds, reptiles and fish, embracing in the number panthers, deer, buffalo, otters, beavers, wild-cats, foxes, wolves, raccoons, opossums, bears, elk, crows, eagles, turkeys, eels, various sorts of fish, large and small snakes, etc. In the midst of this silent menagerie of specimens of the animal kingdom is the full-length outline of a female form, beautiful and perfect in every respect. Interspersed among the drawings of animals, etc., are imitations of the foot-prints of each sort, the whole space occupied being 150 feet long by 50 wide. To what race the artist belonged, or what his purpose was in making these rude portraits, must ever remain a mystery, but the work was evidently done years ago.

FALLACIES IN REGARD TO DIET.

First. That there is any nutriment in beef-tea made from extracts: there is none whatever. Second. That gelatine is nutritious: it will not keep a cat alive. Beef-tea and gelatine, however, possess a certain reparative power, we know not what. Third. That an egg is equal to a pound of meat, and that every sick person can eat them: many, especially those of nervous or bilious temperament, cannot eat them, and to such eggs are injurious. Fourth. That because milk is an important article of

food it must be forced upon a patient. food that a person cannot endure will not cure. Fifth. That arrow-root is nutritious: it is simply starch and water, useful as a restorative and quickly prepared. Sixth. That cheese is injurious in all cases: it is, as a rule, contra-indicated, being usually indigestible; but it is concentrated nutriment, a waste-repairer, and often craved. Seventh. That the cravings of a patient are whims, and should be denied: the stomach often needs, craves for and digests articles not laid down in any dietary. Such are, for example, fruit, pickles, jams, cake, ham or bacon with fat, cheese, butter and milk. Eighth. That an inflexible diet may be marked out which shall apply to every case: choice of a given list of articles allowable in a given case must be decided by the opinion of the stomach. The stomach is right and theory wrong, and the judgment admits no appeal. A diet which would keep a healthy man healthy might kill a sick man; and a diet sufficient to sustain a sick man would not keep a well man alive. Increased quantity of food, especially of liquids, does not mean increased nutriment; rather decrease, since the digestion is overtaxed and weakened. Strive to give the food in as concentrated a form as possible.

ORIGIN OF PAPER MONEY.

All the way from China, and from a period dating more than a hundred years before the time of Christ, there comes to us a story in which some writers appear to see the origin of bank-notes. Among the Celestials it was customary and necessary, so the story goes, for courtiers and princes, whenever they came into the royal presence, to veil their faces with a piece of skin. Now it so happened that at one time the imperial purse was far from full, and it fell to the lot of the Prime Minister to discover some expedient for removing this source of inconvenience. He accordingly spent many tedious hours, and pondered over many schemes, before he could exclaim, like Archimedes, "Eureka!" ("I have found it!") The result of his profound meditations was a decree to the effect that for veiling the face in the presence of royalty only the skins of certain white deer belonging to the

sovereign should be allowed. Of course his Majesty, possessing a monopoly of these deer, could sell pieces of their skin at whatever price he liked. This made them very valuable; they consequently circulated amongst the upper classes of Chinese society as a convenient form of money, and thus we read, "Bank-notes were invented in China."

FRENCH ARTISTS.

The modern French painters seek absolute and textual truth; their aim is to give us by their pictures exactly the sensations of a real vision of human nature or of that more mysterious nature which is not human. In modern French fiction, as in modern French painting, the process is observation of nature, selection and composition. The artist starts from the sensation and not from the idea, and whether he be a writer, a painter, or a sculptor, what he seeks above everything is the vivid pictorial impression, the presentation of the facts or the events which contain their own morality. In life and in nature there is no morality, no conclusion, no rounded story. *C'est comme ca et voila tout.*

Many French artists have risen from the poorer classes. Carolu Duran went through a good deal of trouble, and ate pretty freely of the *vache enragée;* but that, and everything else, pales before the achievements in misery of M. Paul Baudry. He was sent to Paris by the town of Bourbon (Vendée), with four hundred francs a year, out of which had to come twenty-five francs a month for studio expenses. Sometimes he would save his twenty-five francs, and work at home in his garret; but even thus, one fails to see how he ever contrived to keep body and soul together until the happy moment he took a prize, and his allowance was raised to twelve hundred francs a year. Courage, force, and devotion to art have never deserted Baudry, and they stood him in good stead during the two or three years he spent on the gigantic task of decorating the Opera.

SUNFLOWERS AS FUEL — A PECULIAR WOOD.

Sunflowers are used in Wyoming territory for fuel. The

stalks, when dry, are as hard as maplewood, and make a hot fire, and the seed-heads, with the seeds in, are said to burn better than the best hard coal. An acre of sunflowers will furnish fuel for one stove a year. In Nevada there is a peculiar wood known as "mountain mahogany." A tree with a trunk a foot in diameter is much above the average. When dry the wood is about as hard as boxwood, and being of a very fine grain, might no doubt be used for the same purpose. It is of rich, red color, very heavy, and would be a fine material for the wood carver. Used as a fuel it creates intense heat. It burns with a blaze as long as ordinary wood would last, and then is found (almost unchanged in form) converted to a charcoal that lasts about twice as long as ordinary wood. For fuel it stands much higher than any other kind of wood; indeed, a cord of it always brings the same price as a ton of coal. The only objection to it as a fuel is that it creates such an intense heat as to burn out stoves more rapidly than coal.

LARGE DIAMONDS.

The large diamond of 457 carats, found in South Africa in 1884, has now been cut, and weighs about 200 carats. The Kohinoor weighs only 106 carats, the Regent of France 136¾ carats, and the Great Mogul 279 carats, but it is a lumpy stone, and not cut in proper brilliant form, like the Cape stone. There is also a Portuguese stone, the Braganza diamond, but it is doubtful if it is a diamond at all, and not merely a fine topaz. If it is a diamond, it is by far the largest known. There are other diamonds of great value; but the new stone is expected to go far to eclipse them. It is the property of a syndicate at present.

THE HOLY ALLIANCE.

The Holy Alliance was an international treaty, formed directly and personally between the Sovereigns of Russia, Austria and Prussia, whom all the European Powers joined, excepting only Great Britain, the Pope and Turkey, to whom the treaty

was naturally not offered for signature. Its object was to bind the subscribing Powers together in brotherly love and charity as one Christian family, to regulate the government of the three great states representing Christianity and the Greek and Roman churches by the spirit and genius of Christendom, and to unite them in a common union overstepping the differences of their religions, and recognizing their fundamental mainspring.

A REMARKABLE HANGING BRIDGE.

At Carrick-a-Rede, on the coast of Antrim, in Ireland, there is a remarkable hanging bridge. A high rock of basalt stands in the sea, entirely separate from the mainland, from which it has been torn, so to speak, by some great natural convulsion. This basaltic rock is connected with the mainland by means of a bridge of ropes, along which wooden planks have been laid down to give more secure foothold, and there is also a rope handrail. The natives, even under heavy burdens, cross this bridge with ease; but it is rather hazardous for strangers to attempt the passage. The sea roars ninety feet below in a sheer descent.

ANCIENT AND MODERN BRIDGES.

The first bridges ever constructed were of wood, and the earliest of which we have any account were built in Rome about 500 B.C. The bridge of Xerxes, built of boats, across the Hellespont, was a very ancient piece of civil engineering. The next in Roman history was erected by Julius Cæsar for the passage of his army across the Rhine. Trajan's great bridge across the Danube, 4,700 feet long, was made of timber, with stone piers. The Romans also built the first stone bridge which crossed the Tiber. Suspension bridges are of remote origin. A Chinese bridge of this nature, mentioned in ancient chronicles, was made of chains, supporting a roadway 830 feet in length. It was built A.D. 65, and is still to be seen. China has the longest stone bridges in the world, but India the longest wooden one — over five miles. The first large iron bridge was erected over the Severn in 1777. There is a trestle bridge over Lake Ponchar-

HIGH BRIDGE, N. Y.

train, in Louisiana, which is by far the longest in the world. The Suspenson bridge at Niagara Falls has a span of 800 feet, and the great New York and Brooklyn bridge is over 1,500 feet long. The age of railways has brought a remarkable development in this line, especially in the construction of bridges of iron and steel, the most important being the Forth cantilever bridge and the bridge on the same principle over the Indus at Sukkur.

A CAUSE OF HILARITY.

At one time, in the kingdom of Spain, it is said that if a man were seen laughing heartily over a book, that book was sure to be the story of the adventures of Don Quixote. Nowadays, and in England, if any one is seen under similar conditions of hilarity, it may be asserted with almost equal assurance, that the cause of mirth is of transatlantic origin. The English are not a nation of jokers, but it is an accepted idea that the Americans are. Accordingly, if laughter would hold both his sides, it is to American sources that he turns for the occasion of his excitement. Books of American wit and humor crowd their bookstalls. Would any man be merry? Straightway, be buys a volume of Mark Twain, Uncle Remus, or one of the "Fonetik Publikashuns" of the late Josh Billings, and laughs away accordingly.

MARY STEWART

Mary Stewart was one of the book lovers whose taste was more than a mere following of the fashion Some of her books, like one of Marie Antoinette's, were the companions of her activity, and still bear the sad complaints which she intrusted to these last friends of fallen royalty. Her note book, in which she wrote her Latin prose exercises when a girl, yet survives, bound in red morocco, with the arms of France. In a Book of Hours, now the property of the Czar, may be partly deciphered the quatrains which she composed in her sorrowful times.

THE ARMIES OF EUROPE.

It may be of interest to see what armies are maintained and

at what cost by the leading countries of Europe as in comparison with our own. The following table gives the number of soldiers actually in service and the number that can be called out in time of war. A comparison of the soldiers with the population would show that in the event of war almost every man in the country can be called into service:

Countries.	Regular army.	War footing.	Annual cost.
Austria-Hungary	284,071	1,078,904	$ 49,116,248
France	529,269	3,754,164	121 061,600
Germany	445,402	1,492,104	84,968,140
Great Britain	181,971	641,753	90,901,430
British India	190,476	380,000	87,201,270
Italy	750,765	1,985,619	41,098,611
Russia	780,081	2,300,000	125,508,474
Spain	152,895	400,000	24,524,415
Turkey	160,417	410,200	23,844,064

The cost of supporting these huge standing armies looks frightfully large; but it may surprise many readers to be informed of the fact that by the end of this year the American pension list will call for ninety millions, or more money than Germany pays out for the maintenance of her standing army of half a million of men.

Little Belgium, with a population of less than 6,000,000 people, maintains an army of 47,000 men; Norway and Sweden, with 6,300,000, keep 60,000 soldiers in the field, and Denmark, with 2,000,000 people, has 35,000.

It is no wonder, with so many men withdrawn from among the producers and placed among the class that has to be maintained by the labor of others, that those countries do not progress at all, are loaded down with debts, and the people in abject poverty.

The immense navies maintained by most of these countries compare in size and costliness with their armies, rendering the burdens still greater. It is a certainty that the present overgrown armaments cannot be maintained, and that before many years there will have to be a general disarmament.

It will be observed that the three central governments which

are in close alliance—Germany, Austria-Hungary, and Italy—themselves maintain 1,480,000 soldiers, and in the event of war could speedily place 4,500,000 men in the field fully armed and equipped.

THE FRENCH NAVY.

The French navy at present consists of six ironclads of the first-rate, and seven of the second (in wood), four protected cruisers, with a speed of fourteen knots, and *pas un croiseur rapide.* In 1890 it will contain fourteen first-rates, four second-rates, four protected cruisers, and at least three swift cruisers. The German navy contains twelve ironclads, four cruisers, and eleven coastguard monitors. They are not in all respects equal to the best of the French, but they are much better than the second-rates, and are moreover as a rule swifter, and being built of iron, while so many of the French have wood frames, are less liable to suffer from shell fire, and more enduring.

THE WORLD'S KINGS.

In 1883 there were twenty-two kings, including emperors. The number who have ruled in various countries since the battle of Hastings, A.D. 1066, has been as follows:

	No.	Average Reign, Years.		No.	Average Reign, Years.
England	35	23	Spain	32	26
France	34	24	Denmark	39	21
Germany	39	21	Sweden	53	15
Russia	50	16	Turkey	35	17

The Turkish dynasty dates only from 1299. The average reign of the above three hundred and seventeen monarchs was just twenty years.

FASTING.

Voluntary fasting is not by any means a modern invention. In various countries and various ages it has been practiced by people anxious to acquire a special reputation for sanctity. The custom of sitting in Dharna, whereby the Brahmins used to coerce their enemies into submission, does not perhaps come

under this heading; for the object of the sitter in Dharna was not to fast and live, but to fast and die, and thus to lay upon his adversary's head the sin of causing the death of a holy man. But in India and throughout the East a fast of several months is still an acceptable form of penance, and confers on a fakir or dervish who practices it almost as much fame as if he suspended himself by an iron hook, or crawled on his belly till he had lost the use of his limbs. In these cases, however, as in those of the fasting hermits of the Middle Ages, total abstinence is not rigorously insisted upon. The ascetics eat something, if it is only a few handfuls of parched peas or rice. Even St. Simeon Stylites, when he lay "pent in a roofless close of ragged stones," did not refuse "the spare chance gift of those" that came to touch the body of so holy a person.

COLLECTIONS OF STAMPS.

The French navy department in Paris has amassed not merely a huge album, but a gigantic library of stamps. It is the largest collection in the world. This, of course, is public property. The most valuable of all private collections belongs to the Duchesse de Galliera, of the same city. Up to the end of the year 1886, this family souvenir had cost $300,000, or a million and a half of francs.

The Rothschilds, as a mainstay or safeguard of their fortunes, have a collection of postage stamps valued at a quarter of a million francs. If these figures seem incredible, let it be remembered that every square inch of a postage stamp album costs money. And sometimes a five-dollar gold piece will not be enough to purchase some old stamp which, when new, was worth but a single cent or a single sou. Indeed, $5 would be "dirt cheap" for some special favorite and coveted stamp which is now hard to be got. There are, for instance, Brazilian stamps, now out of print, that would fetch from $5 to $10 apiece if offered for sale in Paris, Chicago or San Francisco. A certain English stamp, issued in 1840, bearing the letters V. R.

(Victoria Regina) is now so rare that it will bring in London, Quebec, Montreal or the United States as much as $40. What is known as the blue stamp of Naples, 1820, is now worth between $50 and $60. In order to make this price seem cheap and inviting to the general reader, we will add that there is a "lost pleaid," so to speak, in the shape of a postage stamp issued by the government of British Guiana in 1856, which now commands, at public auction, about $250.

MEDICAL WOMEN IN AMERICA.

In America, we find that medical women are numbered not by tens but by hundreds, and that their practice, both among private patients and in hospitals, is of the most extensive kind. In 1881 no less than 470 were known to have taken medical degrees (exclusive of graduates of eclectic and homœopathic schools), and, in reply to circulars of inquiry, rather more than 300 full answers were received, and some information obtained about 130 more. "Of these 430 women, 390 are found to be engaged in active practice, eleven have never practiced at all, while twenty-nine have practiced for a time and then retired. Of the latter, twelve have ceased practice on account of marriage, seven from ill-health, five have engaged in other work, while the remainder give no reasons. These women are scattered over twenty-six states of the Union, New York, Pennsylvania and Massachusetts having the largest number. There are, so far as we know, no women physicians in the Southern states, with the exception of Maryland, Virginia, West Virginia and Texas; also none in Arkansas, Kentucky and Nevada. While Boston, New York, Philadelphia and Chicago have each quite a large number, many of the answers have come from small villages and towns. Seventy-five per cent were single on beginning the study of medicine, nineteen per cent were married, and six per cent were widows. Their average age was twenty-seven years, and the average time of study before engaging in practice was four and a half years."

A YOUNG GORILLA.

It is seldom that a young gorilla can be brought alive away from its native haunts. Some years ago, however, one had been safely conveyed to Liverpool. It was a great favorite, its pranks being most amusing. At one moment it romped about the sitting-room where it was confined; at another, it gravely looked out of the window. If a visitor came in, it bounded towards him on all-fours, playfully routed about his feet, pulled his beard, seized his arms, and examined his hat and umbrella. When over-excited by fun, a slight box on the ear made him calm for a few minutes. He could clap hands, point with his forefinger, and put out his tongue. Though he fed on a mixed diet, he liked roast meat better than boiled, and was very fond of strawberries. Moreover, he was exceedingly clean and well-behaved.

LUXURIOUS BOOK BINDINGS.

Among the most remarkable examples of luxurious binding, besides the peerless "Bedford Missal," belonging to the British nation, are the "cloisonee" enamel cover of the Greek gospels in the library of Siena; an ivory cover of Byzantine school at Wurzburg in Bavaria; the remarkable early pieces in carved ivory at Berlin; the Codex Whittikind; the very early cover in the Hildesheim Treasury, "open cut," studded with crystals, gems and cameos; the most interesting ivory-carved cover of the Psalter of Charles the Bald, preserved in the Imperial Library of Paris; the beautiful cover in copper gilt and niello of the Sainte Chapelle New Testament at Paris. The great majority of the books in the British Museum are bound in half morocco, with cloth to match the leather. Historical works are in red, theological in blue, poetical in yellow, natural history in green. Besides this, each part or volume is stamped with a mark by which it can be distinguished as their property, and of different colors:—thus red indicates that a book was purchased, blue that it came by copyright, and yellow that it was presented

The average large Atlantic steamer is manned by about 150 men distributed as follows: 32 deck hands under four officers and 9 petty officers; 32 firemen, coal heavers and machinists under 8 engineers; and 65 stewards. Captain Johnston obtained the thousand pounds prize for making the first steam voyage to India. The name of the vessel was the Enterprise, and it sailed from Falmouth, August 16, 1825.

The average speed of an ocean steamer is 12 miles an hour; sailing vessel, 7 miles an hour. The yacht Melbourne in 1876, between the Cape and Australia, averaged 15.6 knots for twenty-four hours. For seventeen consecutive days she averaged 300 knots. Her three largest runs were 374, 365, and 352 knots per twenty-four hours. An American ship, the Sovereign of the Seas, did 352 knots in twenty-four hours in 1852; that was an average of over 15 knots per hour. The first steamer crossed the Atlantic in 1819. The first Atlantic cable was operated in 1858.

The Pacific Ocean covers an area of 71 million square miles; the Atlantic, 35 million square miles; the Indian, 28 million square miles; the Antartic, 8½, and the Arctic, 4½ million square miles. A fathom is six feet. A nautical mile is 6,080 feet, or one geographical mile and 800 feet. A cable's length is about 200 yards.

HEALTHY HOMES

By a few simple rules which all prudent and wise people may carry out in their own homes, the sanitary perils of the seed-time of life, remarks Dr. B. W. Richardson, may be kept from the homestead as easily as from the prison-house. Let every man and his wife be their own sanitarians and make their home a center of sanitation. Let in the sun, keep out the damp, separate the house from the earth beneath, connect the house with the air above; once, nay, twice in the year hold the Jewish Passover, and allow no leaven of disease to remain in any corner or crevice. Let the house clear itself of all impurities as they are produced; eat no unclean thing; drink no impure water; wear no impure clothes; do no impure act; and all the good that science can render you is at your absolute command.

ADVICE TO BATHERS.

The ten commandments for bathers: 1, Do not bathe when excited; 2, Do not bathe when feeling badly; 3, Do not bathe after having been up all night or after excessive exertion, before resting several hours; 4, Do not bathe after taking a heavy meal or alcoholic drinks; 5, Walk slowly to the bathing place; 6, Inquire after the depth and current of the water as soon as you arrive there; 7, Undress slowly, but go into the water at once; 8, Jump into the water with your head first or wet the head quickly if you cannot do the first; 9, Do not remain in the water too long, especially if you are not very strong; 10, After the bath rub the body well to aid the circulation of the blood and take moderate exercise. Bathing and swimming is useful for body and soul, not alone in warm but also in cool weather, if above advice is heeded.

BARBED WIRE.

The following table gives an estimate of the number of pounds of barbed wire required to fence space or distances mentioned, with one, two or three lines of wire, based upon each pound of wire measuring one rod ($16\frac{1}{2}$ feet).

	1 Line.		2 Lines.		3 Lines.	
1 square acre....................	$50\frac{2}{3}$	lbs.	$101\frac{1}{3}$	lbs.	152	lbs.
1 side of a square acre...........	$12\frac{2}{3}$	"	$25\frac{1}{3}$	"	38	"
1 square half acre................	36	"	72	"	108	"
1 square mile....................	1,280	"	2,560	"	3,840	"
1 side of a square mile...........	320	"	640	"	960	"
1 rod in length..................	1	"	2	"	3	"
100 rods in length................	100	"	200	"	300	"
100 feet in length................	$6\frac{1}{16}$	"	$12\frac{1}{8}$	"	$18\frac{3}{16}$	"

WEIGHT OF LOADS.

The following table, computed from actual experience, will be found very useful in calculating the weight of loads, etc., or the weight of any of the articles in bulk. It shows the weight per cubic foot.

Cast-iron	450 lbs.	Loose earth	95 lbs.
Water	62½ "	Common soil, compact	124 "
White pine, seasoned, about	30 "	Clay, about	135 "
White oak	52 "	Clay, with stones	160 "
		Brick	125 "

The following shows the bulk of a ton of different substances, in cubic feet:

Sand	28	Half-rotted manure, coarse, about	50
Earth, compact	18	Timothy hay, moderately pressed	500
Earth, loose	32	Clover, about	750
Half-rotted manure, solid	36		

TO MEASURE CORN IN THE CRIB.

This rule will apply to a crib of any size or kind. Two cubic feet of good, sound, dry corn in the ear will make a bushel of shelled corn. To get, then, the quantity of shelled corn in a crib of corn in the ear, measure the length, breadth and height of the crib inside the rail; multiply the length by the breadth, and the product by the height; then divide the product by two, and you have the number of bushels of shelled corn in the crib.

Another way to measure corn in the crib: Multiply the length, breadth and height together in feet; to obtain the cubic feet, multiply this product by four, and strike off the right figure, and the result will be shelled bushels, nearly.

To find the Number of Bushels of Grain in a Granary. Rule — Multiply the length in inches by the breadth in inches, and that again by the depth in inches, and divide the product by 2150 (the number of cubic inches in a bushel), and for heaped bushels 2748, and the quotient will be the answer.

BRICKS.

Bricks may be estimated at 24 to a cubic foot, and five courses to one foot in height. But as bricks are not often of full size, the following allowances are made for each square foot of the surface, on the face of a wall, namely:

8 inch wall	16 to a square foot
12 " "	24 " " "
16 " "	32 " " "
20 " "	40 " " "

SHRINKAGE OF GRAIN.

Wheat, from the time it is threshed, will shrink two quarts to the bushel, or six per cent in six months, in the most favorable circumstances. Hence, it follows that ninety-four cents a bushel for wheat, when first threshed in August, is as good, taking into account the shrinkage alone, as one dollar in the following February.

Corn shrinks much more from the time it is husked. One hundred bushels of ears, as they come from the field in November, will be reduced to not far from eighty. So that forty cents a bushel for corn in the ear, as it comes from the field, is as good as fifty in March, shrinkage only being taken into the account.

This estimate is taken on the basis of interest at seven per cent, and takes no account of loss by vermin.

SHINGLES.

White cedar shingles are the best in use, and when of good quality will last forty or fifty years in our northern states. They are usually 27 inches long, by from 6 to 7 inches wide; about $\frac{1}{4}$ inch thick at upper end, and about $\frac{5}{8}$ at lower end or butt; and are laid in courses about $8\frac{1}{8}$ inches wide, so that not quite $\frac{1}{3}$ of a shingle is exposed to the weather.

They are usually laid in three thicknesses, except for an inch or two at the upper ends, where there are four. They are nailed to sawed shingling-laths of oak or yellow pine; about 16 feet long; $2\frac{1}{2}$ inches wide, and 1 inch thick; placed in horizontal rows about $8\frac{1}{2}$ inches apart. These are nailed to the rafters, o purlins; which for laths of the foregoing size should not be more than two feet apart from center to center. Two nails are used to each shingle, near its upper end. They should not be of less size than 400 to a pound. Those of wrought-iron being the strongest, are the best; cut ones are apt to break by the warping of the shingles. Two pounds of such nails will suffice for 100 sq. ft. of roof, including waste. An average shingle $7\frac{1}{2}$ inches wide, in $8\frac{1}{2}$ inch courses, exposes $63\frac{3}{4}$ sq. inches; making

$2\frac{1}{4}$ shingles to a square foot of roof; but to allow for waste, and narrow shingles, it is better in practice to allow about three shingles to a square foot.

Shingling, like slating, must plainly be begun at the eaves, and extended upward.

Cypress and white pine are also much used for shingles, being much cheaper, but scarcely half as durable. All shingles wear quite thin in time by rain and exposure. In warm damp climates they all decay within six to twelve years.

OLD AGE.

What are we to reckon as the declining period of man's existence? The point at which old age taps us on the shoulder and says it comes to keep us company, varies with every individual. It depends a great deal on circumstances, which are hardly the same in any two cases. Some writers have said that a man is old at forty-five, others have set down seventy as the normal standard. Dr. John Gardiner, who has written on "Longevity," remarks: "Long observation has convinced me that sixty-three is an age at which the majority of persons may be termed old, and as a general rule, we may adopt this as the epoch of the commencing decline of life."

Suppose then we agree to call no man old till he is past sixty-three. Let us set down the names of some of the illustrious people of the world who have prolonged their days of usefulness after that age. We shall make a table of them, and begin it with those who have died at seventy — that is to say, with those in whom the springs of life have not stood until they have had at least seven years of old age. It will be found, however, to be far from exhaustive, and every reader may find pleasure in adding to it from his own stock of information.

Age at Death.

70.—Columbus, Lord Chatham, Petrarch, Copernicus, Spallanzani, Boerhaave, Gall.

71.—Linnæus, Audubon.

72.—Charlemagne, Samuel Richardson, Allan Ramsay, John Lecke, Necker.

73.—Charles Darwin, Thorwaldsen, Beecher.

74.—Handel, Frederick the Great, Dr. Jenner.

75.—Haydn, Dugald Stewart, Henry Clay, Longfellow.

76.—Bossuet.

77.—Thomas Telford, Sir Joseph Banks, Lord Beaconsfield.

78.—Galileo, Corneille.

79.—William Harvey, Robert Stevenson, Henry Cavendish.

80.—Plato, Wordsworth, Ralph Waldo Emerson, Kant. Thiers, William Cullen.

81.—Buffon, Edward Young, Sir Edward Coke, Lord Palmerston, John Q. Adams

82.—Arnauld.

83.—Wellington, Goethe, Victor Hugo, Thomas Jefferson.

84.—Voltaire, Talleyrand, Sir William Herschel, Bryant.

85.—Cato the Wise, Newton, Benjamin Franklin, Jeremy Bentham.

86.—Earl Russell, Edmund Halley, Carlyle, Thomas Clarkson.

88.—John Wesley.

89.—Michael Angelo.

90.—Sophocles.

91.—John Adams.

99.—Titian.

100.—Fontenelle.

THE PARCELS POST, LONDON.

There is no end to the variety of objects gathered together in a basket connected with the parcels post. On a recent visit to the General Postoffice, London, there were seen fifteen tons of price lists sent out from one of the large coöperative stores, several hundred iron spades from Sheffield, without any packing beyond the address label stuck on the end; several dozen hat boxes; a couple of hundred umbrellas and walking sticks; nearly a hundred lawn tennis bats; parcels of wet flowers; with the

paper peeling off; a sucking-pig in brown paper, with its head exposed; two boxes of bees; over 100 parcels of fish, mostly tied in reeds; the same number of bottles of medicine; and several thousand parcels, of different shapes and sizes, the contents of which it is impossible to guess. This extraordinary assortment represented one night's despatch, the various items going to every part of the United Kingdom.

THE WEIGHT OF MAN'S BRAIN.

Man has not only relatively, but absolutely, the heaviest brain of all animals save two—the elephant and the whale. The average weight of man's brain is forty-nine and one-half ounces; woman's, forty-four ounces. The brain in idiots is remarkably small; indeed, some such have weighed but fifteen, thirteen, and eight ounces apiece. Many men of great mind-power have possessed unusually heavy brains. Witness the historically famous brain of Cuvier, sixty-four and one-half ounces; also those of Schiller, Agassiz, D. Webster, Spurzheim, Chalmers, De Morgan, etc. The more intellectual nations have generally the larger skulls. Of one hundred Parisian skulls twenty-eight had a capacity of more than sixteen hundred cubic centimeters; of one hundred negroes' skulls, only nine exceeded this capacity.

WHO ARE CREOLES?

A general impression prevails that a Creole must be a colored person. As a matter of fact, any one born in a West Indian colony is a Creole of that colony, whether he or she be English, Scotch, Irish, Chinese, Hindoo, or Portuguese in blood. If a Chinese boy, born in Trinidad or British Guiana, were asked if he was a Chinaman, he would promptly reply that he was a Creole of that colony. Any native of tropical America, except a full-blooded Indian, is a Creole; in Louisiana, a person of French descent is a Creole.

THE THREE GOLDEN BALLS.

The Medici family, whose arms were three gilded pills, in

allusion to their profession of medicine, were great money-lenders of Florence, and their arms suggested the adoption by pawnbrokers of the three golden balls.

YELLOWSTONE PARK.

Yellowtone Park is a large tract of country, embracing some thousands of acres, on the borders of Dakota and Montana territories, chiefly noted for its "Geysers," or hot mineral springs, and its splendid scenery. A company has been formed, and is actively employed in laying out the grounds, erecting handsome buildings, and taking active means to insure its popularity and success as a health resort, conducted on the basis of the German watering spas.

THE HAIR IN DRESS.

The hair is a very important factor in dress, having more to do with the general appearance than most people imagine. Indeed, when we reflect how many diverse and picturesque ways exist of dressing the hair, it is somewhat astonishing to see, as we do in this free country, heads turned out by the hundreds and thousands, curl for curl, and pin for pin alike. The color and texture of the hair have much to do with the question of its effective arrangement. And first we must protest against the vulgar and indiscriminate use of the curling irons. In our opinion, no woman whose hair is naturally straight should try to make it artificially curly. Nature gives to every face the hair which suits it best. Black hair, for instance, painfully frizzed and curled, is always objectionable; while the softer and silkier kinds of hair look admirable treated in shining bands or plaits. The somewhat coarse flaxen and ruddy locks, which one sees so often on Anglo-Saxon heads, are especially adapted for wearing curly; while the chestnut hair, which is now so frequently imitated, is seen at its best in heavy plaits. Dyeing the hair flaxen or red is a ridiculous and futile practice, for in nine cases out of ten the complexion, by its different tone, betrays the artifice. A sallow skin crowned by golden locks is a sufficiently diverting

spectacle, and so also is the pale mauve complexion, which it has been our lot to see with several obviously dyed heads.

MIRROR-PAINTING.

The first step in mirror-painting is to decide upon the design. If this is but a copy, take a tracing of it off upon ordinary tracing-paper; if it is to be an original, arrange the selected flowers in a good position; exclude all but the north light, and draw them to size upon drawing-paper, and tint them with water-colors to indicate their coloring, where the deepest shadows should fall, and where the reflected lights thrown from a transparent leaf or petal on to another part of the design appear. By thus obtaining permanent directions as to the management of these important details, the worker can rearrange the real flowers daily, so that the same effect is produced throughout the painting, and she will not be worried by finding that, at a second sitting, all her flowers that were in full shadow are now in light. Take a tracing of the chief outlines of this sketch, rub the glass quite clean with a chamois leather, and lay the tracing paper upon it, with a sheet of red carbonized paper between the glass and the paper; with the point of a hard pencil go over the traced lines steadily, and remove both papers, when the outline will be clearly seen on the glass. Mix a little flake white with medium, add to it a color that matches one of the flower tints, and secure their outlines by going over them with this color in a fine brush. Match one of the shades of the leaves, and work in leaves and stems with the green mixture, but work in the first painting of the flowers before the outline has dried and before the leaf-outline is secured. Work in the deepest shadows first, then the half-tints, and lastly the high lights. Mix all these shades on the palette with the medium, apply them with an even hand, and soften and run their edges into each other with a clean and dry brush. Use as little paint as possible; put it on with but few touches, and be careful that the outline of each petal is clear and not ragged-looking. Having toned in the chief petals, work at the under-petals, and imitate the transparent look of the natural

under part of a petal through which the light is passing by a soft gradation from dark to light, making the tone lighter than nature and running the paint together with a fitch brush, whose hairs are softer than sables. While the paint is drying outline the leaves and fill in their shadows, medium, reflected, and high lights, and leave the work until dry, when repaint the flowers and leaves, softening the color, but bringing it up to its natural tones, deepening such shadows as lie close to the high or reflected lights, and blending together crude masses of coloring. In the final painting add the peculiar markings of the flowers, vein the leaves, and lightly apply washes of transparent color where the colors require warming up or toning down.

FLOATING GARDENS AND FIELDS.

Amongst the most remarkable illustrations of human energy, industry and ingenuity are the floating fields and gardens which exist in the valley of Kashmir, in Eastern Asia, and on Lake Tezcuco, and in the valley of Mexico, America. In the country separating India and China there is much that moves the traveler's wonder, but nothing perhaps more interesting than the floating gardens on the lake, or Dol, by the little old city so famous for its shawls, called of old Srinagar, and now known as Kashmir. In the formation of these floating gardens of Kashmir, their owners avail themselves of the thick growth of grasses and aquatic plants which spring up from the bottom of the lakes, as water lilies, confervæ, sedges, reeds, etc., all intertwined and entangled one with another. Avenues are cut amongst these by the boats, separating them into angular sections of varying lengths and breadths. The plants and grasses are then cut away from their roots at a depth of about two feet under the water. When so detached they retain their solidity, and are pressed somewhat more closely together. Sedges, twigs, reeds, and roots are next placed over the patch lengthways, and over these mud is spread, fished up from the bottom of the river. This gradually permeates and binds together the matted mass of twigs, reeds, and rushes, and when the surface is thus made,

willow stakes are driven through it and down into the bed of the lake, so that the floating garden will rise or fall with the rising or sinking water, but will not escape from its place. By means of a long pole thrust amongst the weeds at the bottom of the Dol and twisted around several times in one direction, a quantity of plants are brought up and carried in the boat to the prepared platform or raft, where they are twisted into conical hillocks about two feet in circumference at the base and the same height. A hollow place is made on the top of each, and this is filled with the soft river mud, to which is sometimes, but not often, added wood ashes. These are for the reception of melon and cucumber plants. Floating gardens and fields, called chinampas, also exist in Mexico, where they were originally constructed to afford the inhabitants protection against invaders. They are raised with reeds, bushes, turf, and mud, and were sometimes big and strong enough to support a dwelling-house. These floating garden-beds are still to be found anchored upon the waters of the Chalco Canal.

HINTS FOR DRAUGHTSMEN.

The surface of a sphere equals the square of the circumference multiplied by 0.3183.

The diameter of a sphere equals the square root of its surface multiplied by 0.56419.

The side of an inscribed cube equals the radius multiplied by 1.1547.

The diameter of a circle equals the square root of the area multiplied by 1.12838.

The diameter of a sphere equals the cube root of its solidity multiplied by 1.2407.

The circumference of a circle equals the diameter multiplied by 3.1416, which is the ratio of the circumference to the diameter.

The area of a triangle equals the base multiplied by one-half of its height.

The diameter of a circle equals the circumference multiplied by 0.31831.

The side of an inscribed equilateral triangle equals the diameter of the circle multiplied by 0.86.

The surface equals the product of the diameter and circumference.

The radius of a circle equals the circumference multiplied by 0.159155.

The circumference of a circle multiplied by 0.282 equals one side of a square of the same area.

The area of a circle equals the square of the radius multiplied by 3.1416.

The square root of the surface of a sphere multiplied by 1.772454 equals the circumference.

The area of a circle equals one-quarter of the diameter multiplied by the circumference.

The area of an ellipse equals the product of both diameters and .7854.

The radius of a circle equals the square root of the area multiplied by 0.56419.

The circumference of a sphere equals the cube root of its solidity multiplied by 3.8978.

The side of a square equals the diameter of a circle of the same area multiplied by 0.8862.

The side of an inscribed square equals the diameter multiplied by 0.7071.

HINTS IN BUYING MACHINERY.

On buying a machine, see that, whether new or second-hand, it is strong and well made. Consider the standing of the maker, both as mechanician and machinist. A light-framed or shakily-fitted machine will be dear at any price. Do not be deceived by any beauty of paint or finish on exposed work, which adds nothing to the usefulness of the machine, and which may draw the eye from an examination of the working parts. Uncover the boxes and see whether the finish of shafts in their bearings or

journals is as smooth and true as the white and brass work of more exposed pieces. Take out, here and there, screws and bolts; see if the threads are deep, sharp, and well-fitted. Look closely at the fitting of all toothed or pinion wheels; note whether they have been cast and filed to fit, or whether they have been accurately cut by automatic machinery, so that they will fit in any position. Slowly turn pinion wheels, and note whether there is any rattling or lost motion, or whether the teeth fit snugly, yet freely, so as to give even, steady motion. Closely examine all castings for pin holes or air bubbles, which may be most easily detected in work that has been planed. See that castings are heavy as well as solid. Look after oil holes and provisions for oiling. See that the castings are neatly fitted; that they do not show the marks of the hammer or file, which must be used to connect them if they have been forced or badly put together. Pay attention to the noise made by the machine when in motion. If fairly fitted the noise will be uniform; if badly fitted, it will be variable or grating. While these remarks apply more particularly to machinery more or less delicate, there are points which all purchasers should attend to.

CAPACITY OF BOXES, BINS, ETC.

By the United States standard, 2,150 cubic inches make a bushel; a cubic foot contains 1,728 cubic inches. Rule—Multiply the number of feet width of bin, by the length, the result by the depth, then divide the product by 5 and multiply the quotient by 4, which number will give the quantity in bushels.

Length.	Breadth.	Depth.		Bushels.
5 ft.	3 ft.	2 ft.	will contain	24
5 "	3 "	3 "	" "	36
5 "	3 "	4 "	" "	48
7 "	5 "	3 ft. 9 in.	" "	100
9 "	6 "	5 ft.	" "	216
13 "	8 "	6 "	" "	500

A box four feet eight inches long, two feet four inches wide, and two feet four inches deep, will contain twenty bushels.

A box twenty-four inches by sixteen inches square, and twenty-eight inches deep, will contain a barrel.

A box twenty-six by fifteen and a half inches square, and eight inches deep, will contain a bushel.

A box twelve inches by eleven and a half inches square, and nine inches deep, will contain a half bushel.

A box eight by eight inches square, and eight inches deep, will contain a peck.

A box eight by eight inches square, and four and one-eighth inches deep, will contain one gallon.

A box seven by eight inches square, and four and one-eighth inches deep, will contain a half gallon.

A box four by four inches square, and four and one-fourth inches deep, will contain a quart.

HINTS ON THE CARE OF TOOLS.

Wooden Parts—The wooden parts of tools, such as the stocks of planes and handles of chisels, are often made to have a nice appearance by French polishing; but this adds nothing to their durability. A much better plan is to let them soak in linseed oil for a week, and rub them with a cloth for a few minutes every day for a week or two. This produces a beautiful surface, and at the same time exerts a solidifying and preservative action on the wood.

Iron Parts—Rust preventives. The following receipts are recommended for preventing rust on iron and steel surfaces:

1. Caoutchouc oil is said to have proved efficient in preventing rust, and to have been adopted by the German army. It only requires to be spread with a piece of flannel in a very thin layer over the metallic surface, and allowed to dry up. Such a coating will afford security against all atmospheric influences, and will not show any cracks under the microscope after a year's standing. To remove it, the article has simply to be treated with caoutchouc oil again, and washed after twelve to twenty-four hours.

2. A solution of India rubber in benzine has been used for years as a coating for steel, iron and lead, and has been found a simple means of keeping them from oxidizing. It can be easily applied with a brush, and is easily rubbed off. It should be made about the consistency of cream.

3. All steel articles can be perfectly preserved from rust by putting a lump of freshly-burnt lime in the drawer or case in which they are kept. If the things are to be moved (as a gun in its case for instance), put the lime in a muslin bag. This is especially valuable for specimens of iron when fractured, for in a moderately dry place the lime will not want any renewing for many years, as it is capable of absorbing a large quantity of moisture. Articles in use should be placed in a box nearly filled with thorouglhy pulverized slacked lime. Before using them rub well with a woolen cloth.

4. The following mixture forms an excellent brown coating for protecting iron and steel from rust: Dissolve two parts crystallized iron chloride, two antimony chloride, and one tannin, in four of water, and apply with sponge or rag and let dry. Then another coat of paint is applied, and again another, if necessary, until the color becomes as dark as desired. When dry it is washed with water, allowed to dry again, and the surface polished with boiled linseed oil. The antimony chloride must be as nearly neutral as possible.

5. To keep tools from rusting, take one-half ounce camphor, dissolve in one pound melted lard; take off the scum and mix in as much fine lead (graphite) as will give it an iron color. Clean the tools and smear with this mixture. After twenty-four hours rub clean with a soft linen cloth. The tools will keep clean for months under ordinary circumstances.

6. Put one quart fresh-slacked lime, one-half pound washing soda, one half-pound soft soap in a bucket, and sufficient water to cover the articles; put in the tools as soon as possible after use, and wipe them up next morning, or let them remain until wanted.

7. Soft soap, with half its weight of pearlash, one ounce of mixture in about one gallon boiling water, is in every-day use in most engineers' shops in the drip-cans used for turning long articles bright in wrought-iron and steel. The work, though constantly moist, does not rust, and bright nuts are immersed in it for days till wanted, and retain their polish.

8. Melt slowly together six ounces or eight ounces lard to one ounce resin, stirring till cool; when it is semi-fluid it is ready for use. If too thick, it may be further let down by coal oil or benzine. Rubbed on bright surfaces ever so thinly it preserves the polish effectually, and may be readily rubbed off.

9. To protect metals from oxidation — polished iron or steel, for instance — the requisite is to exclude air and moisture from the actual metallic surface; therefore, polished tools are usually kept in wrappings of oil cloth and brown paper, and, thus protected, they will preserve a spotless face for an unlimited time. When these metals come to be of necessity exposed, in being converted to use, it is necessary to protect them by means of some permanent dressing; and boiled linseed oil, which forms a lasting film or covering as it dries on, is one of the best preservatives, if not the best. But in order to give it body, it should be thickened by the addition of some pigment, and the very best — because the most congenial — of pigment is the ground oxide of the same metal, or, in plain words, rusted iron reduced to an impalpable powder, for the dressing of iron or steel, which thus forms the pigment or red oxide paint.

WHEN THE WORLD GETS OLD.

The age of the earth is placed by some at 500,000,000 years and still others of later time, among them the Duke of Argyll, places it at 10,000,000 years, knowing what processes it has gone through. Other planets go through the same process. The reason that other planets differ so much from the earth is that they are in a much earlier or later stage of existence. The earth must become old. Newton surmised, although he could give

no reason for it, that the earth would at one time lose all its water and become dry. Since then it has been found that Newton was correct. As the earth keeps cooling it will become porous, and cavities will be formed in the interior, which will take in the water. It is estimated this process is now in progress so far that the water diminishes at the rate of about the thickness of a sheet of writing paper each year At this rate in 6,000,000 years the water will have sunk a mile, and in 15,000-000 years the water will have disappeared from the face of the globe. The nitrogen and the oxygen in the atmosphere are also diminishing all the time. It is in an inappreciable degree, but the time will come when the air will be so thin that no creatures we know can breathe and live; the time will come when the world cannot support life. That will be the period of old age, and then will come death.

SOME COMMON GRAMMATICAL ERRORS.

Say you were, not you was; it was I, or we, or they, not it was me, or us, or them; fewer people were there, not less people; he taught me, not he learned me; put it on the table, not onto the table; he advised or counseled me to use the book, not he recommended me to do so; she looks pretty to-day, not prettily, although we may say, "she looked prettily at her friends while thanking them for their kindness." Do not say "I done;" I did or have done, is correct. So also "I seen" is a barbarism often encountered; I, you, we or they, saw or have seen, should be used instead. Do not say "She invited the General and I," "I do not like that sort of things," "It was different last year than now." Say, "She invited the General and me." Always speak of yourself and another as though speaking of yourself alone, and surely no one would say she invited I. "I do not like those sorts of things." For obvious reasons no grammar needed there. "It was different last year from now." It is habitual with some people to talk of oysters, or fruit or cabbage, as being "healthy" or the reverse. Be precise; an oyster may be in

the enjoyment of robust health, and, as an article of food, is wholesome or not, according to the season."

WHAT IT COSTS TO SMOKE.

[Six per cent compound interest semi-annually being reckoned upon the money.]

From the age of—	Two Cigars a Day at 5 Cents Each.		Three Cigars a Day at 5 Cents Each.	
	Principal.	Prin. & Int.	Principal.	Prin. & Int.
20 to 25 years.............	$ 182.50	$ 209.21	$ 273.75	$ 313.95
20 to 30 "	365.00	490.39	547.50	745.74
20 to 35 "	574.50	868.25	821.25	1,314.72
20 to 40 "	730.00	1,376.08	1.095.00	2,081.16
20 to 45 "	912.50	2,058.44	1,368,75	3,110.74
20 to 50 "	1,095.00	3,094.99	1,642.50	4,494.41
20 to 55 "	1,277.50	4,367.46	1,916.25	6,353.87
20 to 60 "	1,460.00	6,078.73	2,190.00	8,855.02
20 to 65 "	1,642.50	8,378.52	2,463.75	12,215.36
20 to 70 "	1,825.00	11,469.25	2,737.50	16,216.37

WHERE PLANTS ORIGINATED.

The apple came from Europe; the celery came from Northern Europe; the chestnut came from Italy; the citron came from Greece; the cucumber came from the East Indies; the garden cress came from Egypt; the horse-chestnut came from Thibet; the horseradish came from Southern Europe; the mulberry tree came from Persia; the nettle came from Europe; the oats came from North Africa; the onion came from Egypt; the parsley came from Sardinia; the peach came from Persia; the pear came from Europe; the peas came from Egypt; the pine came from America; the poppy came from the East; the potato came from America; the quince came from the island of Crete; the radish came from China and Japan; rye came from Siberia; the spinach came from Arabia; the sunflower came from Peru; tobacco came from America; the walnut came from Persia.

VITALITY OF SEEDS.

The following shows the limit of time beyond which the seeds of the common garden vegetables become useless for sowing: Beans, two years; beets, seven years; cabbage, four years; carrot,

two years; celery, two years; cucumber, ten years; lettuce, three years; melon, ten years; onion, one year; parsnip, one year; peas, two years; radish, three years; squash, ten years; sweet corn, two years; tomato, seven years; turnip, four years.

AGES ATTAINED BY BIRDS.

A blackbird lives twelve years; a blackcap, fifteen; a canary, twenty-four; a crane, twenty-four; a crow, one hundred; an eagle, one hundred; a fowl, common, ten; a goldfinch, fifteen; a goose, fifty; a heron, sixty; a lark, eighteen; a linnet, twenty-three; a nightingale, eighteen; a parrot, sixty; a partridge, fifteen; a peacock, twenty-four; a pelican, fifty; a pheasant, fifteen; a pigeon, twenty; a raven, one hundred; a robin, twelve; a skylark, thirty; a sparrow hawk, forty; a swan, one hundred; a thrush, ten; a wren, three.

AGES ATTAINED BY DIFFERENT ANIMALS.

An elephant lives four hundred years; a whale, three hundred; a tortoise, one hundred; a camel, forty; a horse, twenty-five; a bear, twenty; a lion, twenty; an ox, twenty-five; a cat, fifteen; a dog, fourteen; a sheep, ten; a squirrel, eight; a guinea pig, seven.

TINTS AND COLORS PRODUCED BY THE COMBINATION OF PAINTS AND INKS.

To make bottle green, mix dark green and purple; to make a buff tint, mix white and medium yellow; to make dark brown, mix red, black and blue; to make dark green, mix bronze, blue, lemon yellow and black; to make drab tint, mix white, medium yellow and black; to make flesh tint, mix white, lake and lemon yellow; to make grass green, mix lemon yellow and bronze blue; to make gray tint, mix white and black; to make lavender tint, mix white and purple; to make maroon, mix red, black and medium yellow; to make magenta, mix lake and purple; to make olive green, mix medium yellow and purple; to make orange, mix medium yellow and red; to make pearl tint, mix white,

ultramarine blue and black; to make pink, mix white and lake; to make purple, mix ultramarine blue and lake; to make russet, mix orange, lake and purple; to make sienna, mix medium yellow, red and white; to make sky blue, mix white and ultramarine blue; to make slate, mix ultramarine blue, black and white; to make Turkey red, mix vermilion and black; to make umber, mix white, yellow, red and black.

BUSHELS OF SEED TO THE ACRE

The following different varieties of seed show the quantity of each required to plant an acre: Wheat requires $1\frac{1}{4}$ to 2 bushels to the acre; barley, $1\frac{1}{2}$ to $2\frac{1}{2}$; oats, 2 to 4; rye, 1 to 2; buckwheat, $\frac{3}{4}$ to $1\frac{1}{8}$; millet, 1 to $1\frac{1}{2}$; corn, $\frac{1}{4}$ to 1; beans, 1 to 2; peas, $2\frac{1}{2}$ to $3\frac{1}{2}$; hemp, 1 to $1\frac{1}{2}$; flax, $\frac{1}{2}$ to 2; rice, 2 to $2\frac{1}{2}$; broom corn, 1 to $1\frac{1}{2}$; potatoes, 5 to 10; timothy, 12 to 24 quarts; mustard, 8 to 20; herd's grass, 12 to 16; flat turnip, 2 to 3 pounds; red clover, 10 to 16; white clover, 3 to 4; blue grass, 10 to 15; orchard grass, 20 to 30; carrots, 4 to 5; parsnips, 6 to 8.

DISTANCES BY WATER FROM NEW YORK TO FOREIGN PORTS.

Distance from New York to Alexandria, Egypt, is 5,095 miles; to Amsterdam, Holland, 3,530; to Bermudas, West Indies, 680; to Bombay, India, 11,555; to Bordeaux, France, 3,334; to Brussels, Belgium, 3,418; to Cape of Good Hope, Africa, 6,840; to Cape Horn, South America, 7,000; to Constantinople, Turkey, 5,154; to Copenhagen, Denmark, 3,650; to Calcutta, India, 12,510; to Canton, China, 14,105; to Gibraltar, Spain, 3,290; to Glasgow, Scotland, 2,934; to Halifax, Nova Scotia, 563; to Havana, Cuba, 1,275; to Lima, Peru, 11,312; to Lisbon, Portugal, 3,184; to London, England, 3,376; to Liverpool, England, 3,080; to Madras, British India, 11,840; to Naples, Italy, 4,327; to Pekin, China, 15,325; to Pernambuco, Brazil, 4,926; to St. John, Newfoundland, 785; to St. Petersburg, Russia, 4,432; to —— Sandwich Islands, 7,150; to San Francisco, California, 18,843; to Shanghai, China, 14,510; to

Stockholm, Sweden, 4,075; Valparaiso, Chili, 4,813; Vera Cruz, Mexico, 2,185; Vienna, Austria, 4,095; Yokohama, Japan, 7,523.

AREA AND POPULATION OF PRINCIPAL COUNTRIES OF THE WORLD.

Argentine Republic, area, 1,090,757; population, 2,942,000; Australia, area, 2,971,003; population, 2,335,168; Austria-Hungary, area, 240,922; population, 37,741,434; Belgium, area, 11,373; population, 5,585,846; Bolivia, area, 498,940; population, 2,325,000; Brazil, area, 3,217,645; population, 11,831,326; British Empire, area, 7,890,200; population, 253,521,755; Dominion of Canada, area, 3,372,290; population, 4,324,810; Chili, area, 244,910; population, 2,241,182; Chinese Empire, area, 4,559,369; population, 434,600,000; Colombia, area, 319,-500; population, 3,000,000; Denmark, area, 14,782; population, 1,969,039; Ecuador, area, 247,420; population, 946,033; Egypt, area, 1,148,845; population, 16,400,000; French Republic, area, 738,681; population, 46,922,048; German Empire, area, 212,083; population, 45,234,061; Great Britain and Ireland, area, 121,-608; population, 35,246,502; Greece, area, 25,041; population, 1,979,423; India, British, area, 899,341; population, 198,790,853; Italy, area, 114,926; population, 28,459,451; Japan, area, 148,-456; population, 36,358,994; Mexico, area, 748,355; population, 9,787,629; Netherlands (Holland), area, 12,690; population, 4,172,971; Peru, area, 503,000; population, 2,699,000; Portugal, area, 36,510; population, 4,306,554; Russian Empire, area, 8,397,988; population, 100,372,560; Kingdom of Spain, area, 363,168; population, 25,053,860; Sweden and Norway, area, 293,848; population, 6,492,115; Switzerland, area, 15,992; population, 2,846,102; Turkish Empire, area, 2,396,692; population, 43,391,000; United States, area, 3,602,990; population, 65,155,783; Venezuela, area, 439,120; population, 2,075,245.

COMPOUND INTEREST.

Any sum of money will double at 2 per cent interest, in 35 years; at 3 per cent, in 23 years 5½ months; at 4 per cent, in

17 years 8 months; at 5 per cent, in 15 years 2½ months; at 6 per cent, in 14 years 11 months; at 7 per cent, in 10 years 3 months; at 8 per cent, in 9 years; at 9 per cent, in 8 years and ½ month; at 10 per cent, in 7 years 3½ months.

POWER AVAILABLE FOR INDUSTRIES.

	Human workers.	Horses.	Steam horse-power.	Rivers, horse-power.	Total horse-power.	Ratio.
United Kingdom.....	22,570	2,906	7,780	4,520	17,466	7.5
France..............	27,765	2,833	3,513	6,130	15,253	6.6
Germany............	30,074	3,360	4,325	6,040	16,735	7.2
Russia..............	49,520	16,200	1,365	36,115	58,630	25.0
Austria..............	25,008	3,760	1,280	5,830	13,370	5.7
Italy................	18,310	658	480	3,960	6,929	2.9
Spain................	11,120	590	483	2,220	4,405	1.8
Portugal............	2,780	70	66	640	1,054	0.5
Belgium.............	3,776	283	595	370	1,626	0.7
Holland.............	2,690	280	216	640	1,405	0.6
Scandinavia.........	5,810	970	416	6,360	8,327	3.6
Switzerland.........	1,815	110	253	650	1,195	0.5
Roumania...........	3,520	550	90	1,160	2,152	0.9
Servia..............	1,070	140	35	450	732	0.3
Greece..............	1,020	97	20	420	640	0.2
Europe..............	206,848	32,807	20,917	75,505	149,919	64.0
United States.......	30,116	11,202	8,152	61,150	83,516	36.0
Total...............	236,964	44,009	29,069	136,655	233,435	100.0

All the above powers may be considered in active use, except the rivers, of which less than one-tenth of the power is turned to any use.

AVERAGE VELOCITIES OF VARIOUS BODIES.

	Per hour.	*Per Sec.*
A man walks..............................	3 miles, or	4 feet.
A horse trots..............................	7 " or	10 "
A horse runs..............................	20 " or	29 "
Steamboat runs..............................	18 " or	26 "
Sailing vessel runs..............................	10 " or	14 "
Slow rivers flow..............................	3 " or	4 "
Rapid rivers flow..............................	7 " or	10 "
A moderate wind blows..............................	7 " or	10 "
A storm moves..............................	36 " or	52 "
A hurricane moves..............................	80 " or	117 "
A rifle ball moves..............................	1,000 " or	1,466 "
Sound moves..............................	743 " or	1,142 "
Light moves..............................	192,000 miles per sec.	
Electricity moves..............................	288,000 miles " "	

The term horse-power, referring to a boiler, has no definite meaning. In the early days of the steam engine when there was little difference in the details of engines and boiler, it usually happened that a boiler large enough to furnish one engine with steam would answer for any other of the same size. As the power of the early engines was in direct proportion to their size, any boiler of certain dimensions would furnish steam for an engine developing a definite horse-power, and hence was said to be a boiler of a certain horse-power. As improvements, however, were introduced, and various forms of boilers and engines were adopted, it was found that the size of the boiler was not always a measure of its efficiency, and that different engines required very different quantities of steam to develop a given horse-power. Thus it frequently happens that what is a 10 horse-power boiler for one engine, or a boiler that furnishes steam to develop 10 horse-power in that engine, may be only a 5 horse-power boiler for a more wasteful engine. Under these circumstances it is impossible to decide what is the horse-power of a boiler in case of dispute. If, on the contrary, the rating of the boiler is based upon its evaporation under given conditions, a simple experiment will settle whether it is working up to its rating.

NICE DISCRIMINATIONS IN WORDS.

Pretty refers to external beauty on a small scale. *Grace* of manner is a natural gift; *elegance* implies cultivation. *Well-bred* is referable to general conduct rather than individual actions. *Beautiful* is the strongest word of its class, implying softness and delicacy in addition to everything that is in similar words. *Courtesy* has reference to others, *politeness* to ourselves. The former is a duty or privilege to others, the latter is behavior assumed from proper self-respect. *Benevolent* refers to the character of the agent acting, *beneficent* to the act performed. *Charitable* is restricted to almsgiving except when used in reference to judgment of others. *Lovely* is used only where there is something more than external beauty; when there is a combination of personal beauty and pleasing manner. Faultless features do not make a lady lovely who is disagreeable in disposition.

CHAPTER XXXI.

IMPORTANCE OF BREATHING PURE AIR.

AN abundance of pure, fresh air, is an indispensable condition to the manufacture of bright, arterial blood. We receive air into our human body primarily by the rise and activity of our lungs, the great respiratory organs of the physical system; and secondarily, through the multitudinous pores of the human skin. That the lungs may perform their important functions to the best advantage, it is necessary that we should take a sufficient amount of daily exercise. It would be well, especially for all young men and women, that they should take a regular course of calisthenic or athletic exercises.

These calisthenic and athletic exercises insure other valuable results beside the rapid purification of the blood, such as the easy digestion and perfect assimilation of food, the ready production of tissues and fibers for the whole physical system, and the generation of that peculiar power which we call *nerve force;* but we must always remember that all these, and any other possible good results, are entirely dependent upon the *inspiration of* pure fresh air, and the consequent production of pure, bright arterial blood. Well regulated exercise, in a pure atmosphere, is far better than any "cure-all," since it gives the nearest possible approach to a "Universal Save-All," saving us from impurities of the blood, and the thousand pains and penalties these must surely involve. Walking is the only exercise available for a great army of busy toilers, and if they would walk from two to six miles per day, they would be the better in mind, body and

estate. No other exercise is as good as walking; and for the mothers whose toils and cares bind them to the house, and who find or fancy that they cannot get out, a most decided gain to the physical system, and therefore to the happiness of life, may be insured by standing at the open door or casement, for an hour or two every day, in the sunlight when possible. Daily exercise is an invaluable means for decarbonizing the blood, and renewing its vitality; but perfect health can only be insured when a good system for the thorough ventilation of all living and working rooms, and especially of all sleeping-rooms, is in regular operation. An hour of exercise, even in the purest air, cannot compensate the human system for eight or ten hours spent in a vitiated atmosphere, and when perhaps the muscular strain must be great and the inhalation consequently very rapid.

Never eat your food in a room full of stale, impure air. If you have delicate sensibilities, your appetite for food will probably be spoiled before you begin; certainly your digestion will be impaired, your assimilation impeded, and the food when assimilated will not be nearly as valuable to your system if eaten mixed with poisonous carbonic acid gas, as it would be if diluted with life-giving oxygen. As a condition of health, the odors of the kitchen should never pervade the dining-room. This is one reason why picnic parties are so invigorating: the food, however simple, is assimilated with the life-producing oxygen of pure air.

A sleeping apartment should always be so constructed that the bed may be placed out of the line of any direct current of air flowing between the door and window, or between the door and the chimney. Unfortunately, bedrooms are very frequently, one might almost say generally, constructed so that no other place can be found for the bedstead except right in the line of a strong draught. This is a common cause of the very frequent attacks of influenza, catarrh and bronchitis to which people are subject who live in cold and changeful climates. If people could be persuaded to remember when they are asleep to keep their lips closed, and breathe only through the nostrils, the disastrous

effects of a draught right across the bed would not be so great or so frequent; but every watcher by the bedside of the weary sleeper knows only too well that most people will persist in shutting their eyes and opening their mouths, to see what God will send them. When the sleeper draws in the cold air through opened lips and sings through his nose, the chill of the night air is apt to set up an inflammatory action of the mucous membrane, and hence the bronchitis, etc., etc. The air drawn in through the nose would have a little of the chill taken off before it reached the lungs.

Keep your bedroom well ventilated. You may thus enjoy a pure, sweet, refreshing slumber, and awake without the headache and nausea, which to nervous and delicate people is the general result of sleeping in an atmosphere highly charged with carbonic acid gas. It is of great importance to the preservation of health that we should avoid all public buildings, such as churches, theaters, etc., which are badly ventilated or overcrowded. Many public assemblies suffer severely from these causes. The only safe rule to observe is this: that if the atmosphere of any public building be such as to create a sense of drowsiness or oppressed breathing, it is quite time to quit the place. Remember, too, that sunlight is the quintessence of joyous vigor. Let all the sunlight you possibly can into every room and department of your dwelling, and carefully avoid every place in which the atmosphere is dull, dark and dingy. Every living-room and sleeping-room, every clothes-closet, linen-press, chest of drawers, bath-room, etc., should be opened to a sunbath as often as possible, that every particle of foul atmosphere may be cleansed and purified.

No positive rules can be laid down as to a dietary scale; the man engaged in severe manual labor must take a proportionate quantity of foods which maintain the vital heat, and which recuperate the wasted forces of bone and sinew; and the brain-worker should study to feed his brain with the best and most easily digested food. Most people eat and drink a great deal

too much, and an occasional fast is a wise and healthful provision.

NUTRITIVE VALUES OF FOOD.	Water.	Albumen, etc.	Starch, etc.	Sugar.	Fat.	Salts.	Total per cent.		Carbonaceous to one nitrogenous.	Total per cent.	
							Nitrogenous.	Carbonaceous, as starch.		Nitrogen.	Available carbon.
Bread.......	37	8.1	47.4	3.6	1.6	2.3	8.1	55.00	6.8	1.25	28.21
Wheat Flour......	15	10.8	66.3	4.2	2.0	1.7	10.8	75.50	7.0	1.66	38.57
Barley Meal.......	15	6.3	69.4	4.9	2.4	2.0	6.3	80.30	12.8	0.97	36.61
Oatmeal...	15	12.6	58.4	5.4	5.6	3.0	12.6	77.80	6.2	1.94	40.44
Rye Meal..........	15	8.0	69.5	3.7	2.0	1.8	8.0	78.20	9.8	1.23	38.48
Indian Meal.......	14	11.1	64.7	0.4	8.1	1.7	11.1	85.35	7.7	1.71	43.09
Rice..	13	6.3	79.1	0.4	0.7	0.5	6.3	81.25	12.9	0.97	39.03
Peas	15	23.0	55.4	2.0	2.1	2.5	23.0	62.65	2.7	3.54	38.55
Arrowroot.........	18	....	82.0	....	....	....	....	82.00	....	....	36.44
Potatoes...........	75	2.1	18.8	3.2	0.2	0.7	2.1	22.50	10.7	0.31	10.98
Carrots............	83	1.3	8.4	6.1	0.2	1.0	1.3	15.00	11.5	0.20	7.28
Turnips...........	91	1.2	5.1	2.1	....	0.6	1.2	7.20	6.0	0.19	3.76
Parsnips	82	1.1	9.6	5.8	0.5	1.0	1.1	16.65	15.1	0.17	7.91
Sugar..............	5	...	....	95.0	....	....	....	95.00	...	...	42.22
Treacle	23	....	....	77.0	....	....	....	77.00	...	....	34.22
New Milk.........	86	4.1	....	5.2	3.9	0.8	4.1	14.95	3.6	0.63	8.55
Cream.............	66	2.7	....	2.8	26.7	1.8	2.7	69.55	25.7	0.42	32.17
Skim-milk.........	88	4.0	....	5.4	1.8	0.8	4.0	9.90	2.5	0.62	6.26
Butter-milk........	88	4.1	...	6.4	0.7	0.8	4.1	8.15	2.0	0.63	5.53
Cheddar Cheese....	36	28.4	....	....	31.1	4.5	28.4	77.75	2.7	4.37	47.77
Skim Cheese.......	44	44.8	....	....	6.3	4.9	44.8	15.75	0.3	6.90	27.82
Lean Beef.........	72	19.3	....	....	3.6	5.1	19.3	9.00	0.5	2.97	12.98
Fat Beef..........	51	14.8	....	....	29.8	4.4	14.8	74.50	5.0	2.28	39.99
Lean Mutton.......	72	18.3	....	....	4.9	4.8	18.3	12.25	0.7	2.82	13.95
Fat Mutton........	53	12.4	...	....	31.1	3.5	12.4	17.75	6.3	1.91	40.33
Veal...............	63	16.5	....	....	15.8	4.7	16.5	39.50	2.4	2.54	25.22
Fat Pork..........	39	9.8	....	....	48.9	2.3	9.8	122.25	12.5	1.51	58.89
Green Bacon......	24	7.1	....	....	66.8	2.1	7.1	167.00	23.5	1.09	77.52
Dried Bacon.......	15	8.8	....	....	73.3	2.9	8.8	183.25	20.8	1.36	85.53
Ox Liver....... ...	74	18.9	....	....	4.1	3.0	18.9	10.25	0.6	2.91	13.34
Tripe..	68	13.2	....	....	16.4	2.4	13.2	41.00	3.1	2.04	24.36
Poultry............	74	21.0	....	....	3.8	1.2	21.0	9.50	0.4	3.23	13.99
White-fish	78	18.1	....	....	2.9	1.0	18.1	7.25	0.4	2.79	11.64
Eels	75	9.9	....	....	13.8	1.3	9.9	34.50	3.5	1.52	19.93
Salmon.	77	16.1	....	....	5.5	1.4	16.1	13.75	0.8	2.48	13.60
Entire Egg.........	74	14.0	....	....	10.5	1.5	14.0	26.25	1.9	2.16	18.18
White of Egg......	78	20.4	...	....	....	1.6	20.4	......	....	3.14	9.49
Yolk of Egg.......	52	16.0	....	...	30.7	1.3	16.0	76.75	4.8	2.46	41.55
Butter and Fats...	15	...	....	....	83.0	2.0	....	207.50	....	....	92.22

Pure water is the prime necessity of the human body. Human life can be sustained for many days without the use of any solid food constituents. The history of Dr. Tanner's fast of forty days, and of others who have attempted long fasts, is now sufficiently familiar to the reading public; but no one can live without water. The highest medical authorities have determined that human life cannot be sustained without water for a longer period than five days under the most favorable circumstances. The absolute necessity of water to the human economy is seen in the fact that the human body contains in its structure about fifty-eight and one-half per cent of free water, and that a large additional amount of the chemical elements of water in its physiological structure raises the total to about seventy-two per cent of its weight. A healthy average man requires about six pints of water per diem, and in hot weather or when subject to such vigorous physical exercise as will produce free perspiration, a much larger quantity. It is desirable that a large proportion of this liquid should be absorbed in its natural combination with solid food, and this end would be attained if we used a greater quantity of fruit and vegetables as part of our daily diet. The habit of washing down the solids with frequent drinks is a very injurious one, and many persons who have been severe sufferers with bilious headaches, which completely prostrated them for days together, have found a perfect cure in the simple expedient of never drinking any liquid at the same time that they partook a meal of solid food. The reason of this is obvious: the saliva, gastric juices, and pancreatic secretions are so weakened by excessive dilution that they are incapable of digesting and assimilating the solid food which floats in a sea of liquid, and the bile not finding its natural outlet is forced back and retained in the blood.

But whether in natural combinations with the solid ingredients of nutriment, or separately as drinks, a sufficient quantity of water must be taken in to supply the demands of the system for the cleansing of the pores of the skin and other excre-

tory ducts. The solvent power of water, which renders its presence in the animal economy of the human system so essential to the due performance of its life-sustaining functions, is at the same time one of the chief sources of peril to our life and health. Water by its power of absorbing and dissolving particles of matter is extremely liable to be fouled with impure and poisonous germs. These germs held in solution in the water and imbibed with the water into the human system, become a frequent source of diarrhœa, diphtheria, dysentery, cholera morbus, typhoid fever, etc. Hence it is a matter of the greatest importance that the drinking-water provided for the consumption and use of human beings and other animals should be of the highest degree of purity. Herein lies the most perplexing problem with which sanitary engineers have to cope to provide a sufficient supply of pure, clean, wholesome water for man and beast.

IMPORTANCE OF PERSONAL CLEANLINESS.

Personal cleanliness is an essential condition both to vigorous physical life and to a healthy mental and spiritual life; that, in fact, it is a condition precedent both to life and godliness, is an unquestionable axiom of truth. The daily cleansing of the human body is a duty we all owe both to ourselves and to society. There is no surer means to the enjoyment of sound health, sweet sleep and a peaceful mind. Where water is cheap and abundant a daily bath is eminently desirable, especially for persons who carry weight and perspire freely. For persons of delicate health and a very sensitive skin, which they think exposes them to the risk of taking severe cold after bathing, the ancient Jewish method of anointing the body with oil after the bath may be followed with great advantage. If from any cause the daily bath is impracticable, or is thought to be impracticable, a good substitute may be found in what is known in hydropathic institutions as "the towel wash."

THE IMPORTANCE OF SLEEP.

A sufficient amount of sweet, refreshing sleep is the great

restorative for all the organs of the body, and all the faculties of the mind. A healthy man or woman needs at least eight hours' sleep to preserve all the human faculties in full health and vigor, and the hour of rising should not be later than 6 A.M. in winter, and 5 A.M. in summer. A person of feeble constitution or in poor health should take at least ten hours' sleep and rise at the same hours. Children need at least twelve hours' sound sleep for the development of their physical and mental organization, and the maintenance of their vital forces; and the same provision should be made for their rising early and breathing the pure morning air. Sleep to be sweet and refreshing must be honestly earned by labor and exercise. Sleep induced by narcotics is of little or no value as a renovator. Sleeplessness in a genuine worker may often be relieved by a change of thought and exercise: the literary worker whose life is sedentary may woo and win sweet sleep by a vigorous walk; the merchant to relieve the strain of business cares may read some entrancing book to completely divert his thought and soothe to rest; the public speaker, whose brain is overcharged and whose nervous system is highly excited, may secure sound sleep by soaking his feet in cold water for ten minutes and drawing off the blood from the brain; but in whatever way it may be induced the sleep of the man who honestly works with bone and sinew, or with brain and nerve, will surely be sounder and sweeter than that of the vagrant and listless. Idleness, luxurious, self-indulgent feeding, and alcoholic excitation, are the most inveterate foes of that great renovator of the human frame and force. The most refreshing and renovating sleep is that which is secured before midnight. The old axiom that "one hour before twelve o'clock is worth two hours after," is certainly confirmed by experience; though in our youthful days we are little disposed to take heed to the maternal advice of our grandmothers, a wider knowledge teaches us the wisdom of many of their tender cautions. We can all soon learn to see that "'tis the early hours' sleep that gives the rose-blush to the maiden's cheek."

The ill-health and short life-tenure of night-workers is notorious, and their lives are "loaded" as bad by all life insurance companies. In fact, night-workers, whether in the printing-office, the drug-store, the mine or the factory, have developed a new class of diseases of the brain and heart. All ancient nations teach maxims which proclaim the untold value of the early hours of sleep; all eastern nations practice these maxims to the full extent, and need no lunatic asylums; and all scientific and physiological investigation of modern times by the most eminent men tends to confirm the wisdom of the old saw:

> "Early to bed and early to rise,
> Is the way to be healthy, wealthy and wise."

PHYSICAL AND MENTAL HEALTH A UNIT.

The last proposition upon which we briefly touch in this exposition of the laws of hygienics as a science is this:

That the continued neglect of any one of these sanitary and physiological laws of health and life may more than counterbalance all the care and expense we may incur in other directions for the preservation of life and health.

Our human personality is a unit,—a unity of living forces so fearfully and wonderfully made, and adjusted with such fine delicacy and perfect precision, that if one member suffers in the least degree all the members certainly suffer in that same degree. Hence the laws which govern human health, etc., are a *perfect unit.* Whoever offends in one point may suffer the consequence of the violation of all. A man may live in the open air, but if he eats impure food and imbibes poison for drink he may die of cholera or pneumonia; he may be cleanly in person, but if he gets no healthy sleep his cleanliness will not insure physical health and mental vigor. One moment's inhalation of "foul-damp" will kill him as certainly as the violation of the whole code. The great object of all sanitary reformers is, and must be, to induce the members of society individually to understand and feel the value of this simple code of laws in its unity and

relation, by the observances of which every one may do for himself or herself all that can be done by any one person to promote the perfect sanitation of the whole community.

TIME REQUIRED FOR DIGESTION AND ASSIMILATION OF VARIOUS FOODS.

	HRS. MIN.
Rice, boiled	1:00
Eggs, whipped raw	1:30
Trout, fresh, fried	1:30
Barley soup	1:30
Sweet, ripe apples, raw	1:30
Venison steak, broiled	1:45
Boiled sago	1:45
Boiled tapioca	2:00
" barley	2:00
" milk	2:00
Sour apples, raw	2:00
Cabbage with vinegar	2:00
Milk, raw	2:15
Eggs, roasted	2:15
Turkey "	2:30
Goose, "	2:30
Sponge cake	2:30
Hash	2:30
Beans, boiled	2:30
Parsnips, boiled	2:30
Potatoes, baked	2:30
Cabbage, raw	2:30
Custard, baked	2:45
Oysters, fresh, raw	2:55
Eggs, fresh, soft boiled	3:00
Beefsteak, broiled	3:00
Mutton, fresh, boiled	3:00
Bean soup, boiled	3:00
Chicken soup	3:00
Apple dumpling, boiled	3:00
Oysters, roasted	3:15
Salt pork, broiled	3:15
Mutton, roasted	3:15
Bread, corn	3:15
Carrot, boiled	3:15
Sausage, broiled	3:20
Oysters, stewed	3:30
Butter, melted	3:30
Cheese, old	3:30
Oyster soup	3:30
Wheaten bread	3:30
Turnips, boiled	3:30
Potatoes, "	3:30
Eggs, hard boiled	3:30
Eggs, fried	3:30
Green corn and beans, boiled	3:45
Beets, boiled	3:45
Salt salmon, boiled	4:00
Beef, fried	4:00
Veal, broiled	4:00
Boiled fowls	4:00
Salt beef, boiled	4:15
Salt pork, fried	4:15
Salt pork, boiled	4:30
Veal, fried	4:30
Cabbage, boiled	4:30
Pork, roasted	5:15
Beef suet, boiled	5:30

ATMOSPHERIC CAPACITY OF GREAT BUILDINGS.

Estimating each person to require 19.9 sq. in., the seating capacity of some of the great buildings of the world is as follows.

Where steam heat or stove heat is used a much greater area is required, because of the dessicated condition of the air. The use of electric light increases the breathing area; gas diminishes it.

CHURCHES.	NO. OF PERSONS.
St. Peter's, Rome	54,000
Milan Cathedral	37,000
St. Paul's, Rome	32,000
St. Paul's, London	25,600
St. Petronis, Bologna	24,400
Florence Cathedral	24,300
Antwerp Cathedral	24,000
St. Sophia's, Constantinople	23,000
St. John's, Lateran	22,900
Notre Dame, Paris	21,000
Pisa Cathedral	13,000
St. Steven's, Vienna	12,400
St. Dominic's, Bologna	12,000
St. Peter's, Bologna	11,400
Vienna Cathedral	11,000
St. Mark's, Vienna	7,500

OPERA HOUSES AND THEATERS.	NO. OF PERSONS.
Barnum's Hippodrome, N. Y.	8,433
Stadt Theater, New York	3,000
Academy of Music, Philadel'a	2,865
Carlo Felice, Genoa	2,560
Academy of Music, Brooklyn	2,500
Opera House, Munich	2,367
Alexander, St. Petersburg	2,332
San Carlos, Naples	2,240

OPERA HOUSES AND THEATERS.	NO. OF PERSONS.
Columbia Theater, Chicago	2,300
Imperial, St. Petersburg	2,160
La Scala, Milan	2,113
Academy of Paris	2,092
Covent Garden, London	2,684
Academy of Music, New York	2,526
Boston Theater	2,972
Music Hall, Boston	2,585
Grand Opera Hall, N. Orleans	2,052
St. Charles Theater, "	2,178
Grand Opera House, N. Y.	1,883
Booth's Theater, N. Y.	1,807
Opera House, Detroit	1,790
McVicker's Theater, Chicago	1,786
Grand Opera House, "	1,786
Ford's Opera H'se, Baltimore	2,001
National Theater, Washington	1,500
De Bar's Opera H'se, St. Louis	1,696
California Th'ter, San Fr'cisco	1,652
Euclid Avenue Opera House, Cleveland	1,650
Berlin Opera House	1,636
Albany Opera House	1,404
Hooley's Theater, Chicago	1,373
Coulter Opera H'se, Aurora, Ill.	1,004
Montreal Opera House	928

CHAPTER XXXII.

HOUSEHOLD REMEDIES AND SIMPLE SURGERY.

A POPULAR treatise designed for the education and help of the multitude in their home life, can never rightly claim to enable the reader to dispense with the invaluable aids to be derived from experts in the many and various branches of human skill and learning. While this is true of every department of science and art, it is most emphatically and preëminently true of medical science and the arts of healing. The suggestions and prescriptions contained in the following pages are not designed to exclude the medical practitioner, nor even to suggest that his presence may not be necessary; nor are the limits on simple surgery for the household intended to supplant the skillful surgeon. All that can be done, even at the best, is to enable parents and others to meet the thousand and one emergencies which arise in daily life with a calm confidence and ready wit, when it may not be practicable to secure the services of medical or surgical practitioners. The method that seems most useful for the ordinary purposes of practical life will require a few hints on the following subjects:

The nurture and treatment of children; practical household remedies for adults; simple surgery for injuries arising from accidents, etc.; treatment to be adopted for the restoration of persons whose lives are endangered by drowning or poisons.

THE NURTURE AND TREATMENT OF CHILDREN.

The most essential condition for the life and health of a child is, that, during the first period of its existence it should be nour-

ished by human milk, *i. e.* either that of its mother, or of a thoroughly sound, healthy wet-nurse. No other aliment can ever fully supply the wants of the human babe. Where the constitution of both parents is sound, and the laws of hygienics are constantly observed, the child may have a fair prospect of escaping many of the perils to life which so fearfully increase the list of infant mortality, if it be nourished by its mother or a suitable substitute. The length of time to which the nourishment of the human breast should be continued for the child to attain a vigorous constitution must depend upon a variety of circumstances, principally the health of the mother and the constitutional tendency of the child, *i. e.* whether it be of a weakly or strong habit. No absolute rule can be stated, and the customs of different nations reveal a great diversity of opinion among the mothers themselves as to this point. In some Eastern nations it is by no means uncommon for the mother to suckle her babe until another takes its place, or even until it is eighteen months or more of age, and the children thus reared are generally remarkably healthy and vigorous. All nature teaches that where progeny derives nutriment from the mother, the modern practice prevalent in European and the Anglo-Saxon races of weaning off the babe from the breast and putting it upon the feeding-bottle as early as possible ought to be severely reprobated. If the mother is healthy and has a sufficient supply of milk, such a custom can only be productive of increased care, anxiety and expense to the parents, and add greatly to the probable sufferings of the child and to the risks to which its life is subject.

A word of caution is in these days absolutely necessary to parents who really value the lives of their children as to the use of "soothing syrups" and quack medicines so largely advertised for administration to children. Many of them owe any efficacy they may seem to possess to the presence of narcotics, the use of which, either by the mother for the relief of her own feelings, or for administration to the babe to still its murmurs and soothe

it to unnatural sleep, is almost certain to bring about a future inheritance of woe. When other food than its mother's milk becomes necessary for the child before it has cut its teeth, it ought to be entirely of a liquid character. When the milk of a cow is used, great care should be exercised if possible to insure that the milk is drawn from an animal that is in perfect health, and if she is associated with a herd, the whole herd should be thoroughly free from all eruptive and other diseases. Measles, scarlatina, scarlet fever and even typhoid fever are frequently communicated from the contagion of cow's milk, and it has been abundantly proved that the infant mortality arising from the use of impure milk is very heavy. Cow's milk given to an infant should always, if possible, be drawn from the same cow, and should be diluted with scalding water as long as its use is continued. Various preparations of "condensed milk," and "artificial human milk," are in the market, and some of these are doubtless valuable aids in the rearing of children when it is impossible to obtain the genuine article.

In prepared food for babes, flour or meal should not be used, as it is likely to produce viscid humors instead of a wholesome nutritious chyle; biscuits or stale bread boiled in a mixture of equal proportions of pure milk and pure water may be used with advantage. Children who are brought up by hand, *i.e.* who are not nourished by the mother or a wet-nurse, require an occasional change of diet;—for this purpose thin oatmeal gruel supplies a suitable and wholesome diet in alternation with milk prepared as directed. When a babe is six months old weak veal or chicken broth may be given, and subsequently as the constitution of the child is able to bear them, such cooked vegetables as are not of a very flatulent nature, *i. e.* carrots, parsnips, endive, etc., and such stewed fruits as apples, pears, plums, etc. Great care should be exercised that the digestive system of the child is not at any period overladen and overtaxed with food too rich and heavy for assimilation, *i. e.* thin bread with a thick coat of butter and a thicker coat of rich jam. Some Eastern

nations make no use whatever of cow's milk or butter either for themselves or their children; the Chinese, for instance, use almost wholly a vegetable diet. They are very prolific, and their babes are not as subject to convulsions in teething, etc., as are the children of Western nations. The two main principles to be observed in the feeding of children are:

That the food should be of the most simple and wholesome kind.

That the food should be given only at regular intervals of time to allow the stomach a period of rest. The child that is always eating will seldom digest anything well.

When an infant has been weaned and has cut the necessary teeth, small quantities of meat may be given with a general vegetable diet; but smoked and salted meats (especially pork), entrées, cheese, pastry, confectionery and all heavy dishes made of boiled or baked flour should be rigorously excluded from its diet. Potatoes, either mashed or in broth, may be given in small quantities, but always without butter. The periods of feeding must depend partly upon the age and health of the child. A young child requires aliment frequently because of its rapid exhaustion of vital force; a weak child must be often nourished because its organs are incapable of assimilating much food. The following order has been proved to be conducive to health:

At 6 A.M. a sufficient supply of lukewarm milk with well-baked stale bread.

At 9 A.M. a liberal quantity of stale bread with fruit, preserves, or a little butter.

At 12 M. a mixed diet of vegetables, enough to satisfy the hunger.

At 4 P.M. bread with fresh fruit, or in winter, jam or preserved fruits.

At 7 P.M. a light supper of bread and milk, fruit or vegetable soup, but no heavy or flatulent food of any kind, as this will spoil its healthy sleep.

Whole meal or wheaten bread should always be used for chil-

dren in every stage of their growth, as they cannot derive the necessary carbonaceous elements for building up a sound set of teeth and bones from the starchy substance known as "*fine white bread.*" Bread should be well baked and not be used for children until it is moderately stale. The saliva and gastric juices of children must not be diluted with large quantities of liquid of *any kind,* or the digestive functions will certainly suffer; and no alcoholic drinks should be given under any circumstances. A fruit and vegetable diet will supply all the moisture necessary to quench a natural thirst. The idea that many mothers cherish, that as often as a child cries it must be quieted with food or drink, is productive of much injury to its health. The sleep of a child must be regulated by its age and health. Infants cannot sleep too long, as healthy sleep promotes circulation and facilitates the assimilation of food. The recumbent posture is the most favorable to growth and development. Everything that can be done to promote a full night's sleep should be done; such sleep is more natural and healthy than the brief snatches of sleep which may be necessary during the day.

PRESCRIPTIONS FOR CHILDREN.

Great care is necessary in giving medicines to children that they are not overdosed. Convulsions. The old-fashioned method of giving an infant threatened with convulsions a hot bath (as hot as it can be borne), freely rubbing and washing its limbs, and swathing it in flannels until a free perspiration is induced, has saved many a child's life. This method has the advantage of being always and quickly available. Convulsions are very frequently, perhaps generally, brought on by overfeeding or feeding with heavy, rich, unsuitable food, and "prevention is better than cure." The following remarkable case in which chloroform was administered by a surgeon to an infant in convulsions and with successful results may be read with interest; it must be remembered, however, that only a skillful practitioner can determine in any case, either of an infant or adult, whether the administration of chloroform may or may not be fatal to life: Numerous reme-

dies having been already used without effect, the administration of chloroform was determined on at 9 P.M., when the child was rapidly sinking. Half a drachm of chloroform was dropped in a thin muslin handkerchief, which was then held about an inch from the child's face, and in about two minutes the convulsions ceased and the child fell asleep. The influence of the anæsthetic was then sufficiently relaxed to allow nourishment to be given. This treatment was continued from Friday 9 P.M. to Monday 9 A.M; the child's life was saved and no injurious after-effects were revealed.

Hooping Cough.—Dissolve one scruple of salt of tartar in one quarter pint of water; add ten grains of cochineal, and sweeten with sugar. Give to an infant a fourth part of a tablespoonful four times a day; give to a two-year-old half a spoonful as often, and to a four-year-old and over one full tablespoonful at same intervals.

Roche's Embrocation for Hooping Cough is prepared and used as follows: Oil of olives, two ounces; oil of amber, one ounce; oil of cloves, one drachm. Mix freely and rub the embrocation on the chest and throat at bed-time.

Scurf on the Scalp of Infants.—Take lard (fresh) two ounces; diluted sulphuric acid, two drachms; rub them well together and anoint the scalp once or twice a day.

Scurf on the Scalp.—Put a lump of fresh quicklime, about the size of a walnut, into one pint of pure spring-water; let it stand about twelve hours, then pour off the clear lime-water from the sediment; add to the water a quarter of a pint of pure white vinegar and wash the scalp with the mixture. This is a perfectly harmless and very effectual remedy.

Ringworm.—For infants, children or adults. The head should be washed twice a day with soft-soap and warm soft-water; when the hair is dry the ring should be rubbed with a linen rag dipped in gas tar ammonia. A gentle aperient, such as sulphur and treacle for children or Epsom salts for adults, must be taken every morning. Great care must be used that all brushes and

combs used are thoroughly cleansed every day. The ammonia must be tightly corked and kept in a dark place, as it is very volatile.

Ringworm on the face, neck, or body may be effectually treated without any disfigurement by the use of citric ointment, or as it is sometimes called "citrine." The citric ointment must be well rubbed into and around the ring with the forefinger. Be careful to thoroughly wash the finger and hand used before touching any other part of the body with it, or the eruption may be communicated. Never use a towel or brush that has been used by a person, or for a child having ringworms.

Worms in the stomach, or bowels. Fresh quicklime should be dissolved in clean cold water; the mixture must stand until the water is quite clear, when the lime-water may be drawn off and bottled. A wine-glassful given every morning is a simple but invaluable *spring medicine* for children and adults, especially where there is any indication or suspicion of worms. Also for rough skin, tetters, etc.

Teething of infants often occasions them a great deal of needless suffering. The gums should be carefully examined and felt with the forefinger of the right hand. If there is any indication of a tooth trying to cut its way through and the gum does not yield, the gums should be lanced without any delay, and the lancing be repeated as often as may be necessary to give the babe perfect relief from suffering. Neglected teething often induces convulsions. Croup, mumps, diphtheria and other serious infantile diseases need an experienced nurse and medical care.

PRACTICAL HOUSEHOLD REMEDIES FOR ADULTS.

If due caution be observed in relation to the laws of health as laid down in "The Science of Hygienics" a perfect immunity may be secured from many of the most serious and fatal diseases, such as rheumatic fever, typhoid fever, cholera and dysentery, as well as from the numerous ailments which are the plague and sorrow of so many human lives. As many, however, fail to realize

the necessary conditions of health, it is expedient to present some simple practical prescriptions the efficacy of which has been established by long experience.

Weak and Sore Eyes.—Take of sulphate of zinc, three grains; of tincture of opium, ten drops; of pure water, two ounces. Mix well and bathe the eyes with the mixture three or four times a day.

Toothache.—Two or three drops of essential oil of cloves should be put upon a small piece of lint or cotton wool, and placed in the hollow of the tooth. This remedy does not injure the gums nor destroy the tooth, and in the case of exposed nerves is generally very effective in removing pain. In severe toothache arising from exposed or diseased nerves in hollow teeth, it is sometimes necessary for the relief of the sufferer—and when the drawing of the teeth is impracticable or undesirable—to entirely destroy the vitality of the nerve. Take a small piece of lint, dip it in creasote, dust over this a fine coating of powdered arsenic, moisten the whole with alcohol, and press the lint firmly up the hollow teeth to the nerve; keep the mouth closed, breathing only through the nostrils; after a little while that nerve will never give any further trouble.

Cutaneous Eruptions.—Ipecacuanha wine, four drachms; flowers of sulphur, two drachms; tincture of cardamoms, one ounce; mix well and take one teaspoonful of the mixture three times a day in a wine-glassful of water. This mixture is effective for many eruptions of the skin.

Earache and Deafness.—These painful disorders may arise from a general disturbance of vital forces, from an undue accumulation of wax in the ear, or from some disease of the organs of the ear. In the first case the general health must be restored; in the second case some solvent, such as warm olive oil or glycerine dropped in the ear, may afford relief; in the third case, no one but a competent aurist can determine the nature or extent of the mischief, and in either case the human ear is so delicate and complicated a structure that it is far safer and better, when-

ever practicable, to consult a skilled physician or surgeon. It is not expedient to syringe the ears with water, as was formerly a common practice, without a definite knowledge of the causes that create earache and deafness.

Headache.— Dr. Clark's prescription for *Nervous Headache* is as follows: take of socotrine aloes and powdered rhubarb, one drachm each; compound powder of cinnamon, one scruple; hard soap, half a drachm, and mix with syrup sufficient to form a mass; divide into fifty pills and take two at a time as often as may be necessary. Headache in general arises from such a variety of causes that no remedy can be advised until the specific cause is determined. Sedentary habits and excessive brainwork are a prolific source of this disorder, and the best remedy will be found in taking plenty of exercise in the pure air and sunlight and a free use of bathing in cold or tepid water. Excessive eating and alcoholic drinks are the most frequent cause of this complaint. Abstinence and mild purgatives are in general the most efficient remedy. Sympathetic headaches arising from disease of some of the vital organs can only be dealt with by the medical practitioner.

Heartburn is occasioned by acidity of the stomach or its opposite, an alkaline condition of the gastric juices. Small doses of carbonate of soda taken immediately before or after meals will remove heartburn arising from acidity; if this does not give relief squeeze the juice of a lemon into a half glass of water and drink it.

Neuralgia.— A distressing nerve pain generally produced by exhaustion or exposure. It may reveal itself in any of the limbs, in various parts of the body, or in the vicinity of some vital organ, such as neuralgia of the heart, stomach, etc. Most frequently the head and face are the objects of the attack, and it is the result of a severe cold; occasionally it is due to malaria and becomes periodic. Acute attacks require sulphate of quinine, five grains every four or five hours at first, the doses to be gradually reduced in quantity and frequency. The general

treatment demands the building up of the system by nutritious diet and plenty of refreshing sleep. Neuralgia affecting vital organs, such as the heart, necessitate the immediate advice of a physician.

Sore Throat.—Patients subject to sore throat may find speedy relief in the early stages from the following simple, inexpensive, old-fashioned remedy: Take twenty or thirty leaves of common sage, infuse it in boiling water for an hour; add enough vinegar to make it moderately acid, and sweeten it with honey. Use the infusion as a gargle three or four times a day; it is pleasant to the taste. The combined astringent and emollient properties generally produce the desired effects, and the infusion may be swallowed without fear. Sore throat arising from excessive strain of the vocal organs in public speaking, singing, etc., or from prolonged exposure to the vitiated atmosphere of a crowded audience room, may generally be relieved by the use of some of those bronchial lozenges prepared as a specific, some of which such as Brown's Bronchial Troches are invaluable for this purpose. Sore throat which does not yield to simple remedies should be diagnosed by a physician, as it may be indicative of diphtheria, bronchitis or other serious forms of disease of the respiratory organs.

Asthma.—This painful affection may ofttimes be relieved by the following simple remedy: Mix two ounces of pure honey with one ounce of castor oil, and take a teaspoonful every night and morning.

Colds and Coughs.—A valuable mixture for quick relief is made as follows: Solution of acetate of ammonia, two ounces; ipecacuanha wine, two drachms; antimony wine, two drachms; solution of muriate of morphine, half a drachm; treacle, four drachms; mix well and add half a pint of water. Take two tablespoonfuls three or four times a day. Severe cold and cough intensified by a disordered system requires additional treatment. Take of compound ipecacuanha powder, half a

drachm; fresh dried squills, ten grains; sulphate of quinine, six grains; treacle in sufficient quantity to make a mass. Divide into twelve pills and take one every morning and evening.

Dyspepsia or Indigestion. — These disorders are generally induced by sedentary habits, breathing foul air, eating excessive quantities of food, eating indigestible, unwholesome food, drinking alcoholic drinks, or excessive quantities of liquids of any kinds; the best and only permanent cure must be effected by dietary treatment and hygienics; a simple diet of fruit and vegetables and as little liquid as possible, and plenty of exercise in the fresh air. When medicine is required the following prescription may be useful: Infusion of calumba, six ounces; carbonate of potash, one drachm; compound tincture of gentian, three drachms. Mix well and take two or three tablespoonfuls every day.

Fainting Fits. — A feeble or imperfect action of the heart and lungs often produces a sudden unconsciousness. Persons of weak organic development are very subject to these fainting fits when exposed to the foul atmosphere of heated and crowded rooms. They may be known from other fits by the absence of convulsions, low and feeble pulse and slight respiration. Place the patient in a horizontal position, dash cold water in the face, apply camphor to the nostrils and mustard to the soles of the feet; this will revive the circulation. Persons predisposed to fainting fits should be very scrupulous about their diet and general habits; everything that can induce an even and vigorous circulation of the blood, free respiration in pure air, and a thorough digestion and assimilation of food at regular hours, must be done to effect a cure of this tendency. All violent emotions must be avoided.

Hysteria. — A disease generally resulting from a low nervous tone, and occurs most frequently to those under thirty-five years of age. The symptoms of hysteria vary: generally great dejection, sudden fits of crying, alternating with loud bursts of unprovoked laughter, are the premonitory symptoms of a

severe attack. These are followed by paroxysms of contortions of the body, loud screaming, laughing and crying, which are often a source of fright and much anxiety to friends. Treatment of patients during the attacks is limited to loosening all the clothing, especially the corsets, giving plenty of fresh air, and quickening the circulation by the free and vigorous use of cold water dashed upon the face, chest and arms. A strict course of hygiene, plenty of exercise, nutritious food, cheerful associations, and an occasional use of such medicinal remedies as will give tone and regularity to the whole system, will do much to reduce the frequency and severity of the attacks.

Epileptic Fits. — The patient is suddenly attacked by convulsions, accompanied by loss of consciousness, sensation and volition, with foaming at the mouth, protrusion of eyeballs, etc. Total abstinence, strict regimen and careful hygienics afford the only relief or possible cure.

Bleeding at the Nose. — To arrest bleeding at the nose, take a small piece of lint, dip it in some mild styptic, such as alum water, solution of bluestone, or Friar's balsam, or if these are not at hand, dip it in ice-water, and by the use of a small probe press the lint well up the nostrils and plug them; this will generally suffice; if not, ice water snuffed well up the nostrils may succeed. Persons subject to bleeding of the nose of a severe character should always keep "Ruspini's Styptic" at hand; it will be found most beneficial. If the hemorrhage is very profuse the advice of a physician should be secured.

Bleeding from the Lungs. — This is a complaint of very frequent occurrence in the middle latitudes of the United States. It may be induced by hereditary predisposition to consumption, by a severe cold settled upon the lungs, or by injury to the respiratory organs from frequent and long continued inhalation of foul air. Symptoms: In hemorrhage from the lungs the blood is coughed up by violent effort — not vomited as in bleeding from the stomach, etc., and the blood is of a scarlet color and frothy consistency. The hemorrhage closes the air passages in

the throat, and the sufferer is in danger of choking. Treatment: A drop of paregoric mixed with a teaspoonful of vinegar and diluted with cold water makes a suitable remedy; give a teaspoonful every half hour until relief is obtained. The patient should sit up in bed, and no mental or physical effort should be permitted. Nourishing diet should be given as often as the patient is able to take, and the chest should be sponged with vinegar and water. An experienced physician should be summoned without delay.

Boils.—These painful afflictions generally arise from a thoroughly depraved condition of the blood. They may be brought to a head by warm poultices of chamomile flowers; boiled white-lily root, or onion root, by fomentation with hot water, by stimulating plasters, or by a piece of fat meat sliced thin, put in contact with the boil for about twelve hours. As soon as the boil comes to a head it should be lanced. A rigorous course of dieting and hygienics should be at once adopted and maintained to purify the blood and reinvigorate the system. Ten grains of sulphate of quinine daily for a week may break up a threatened course of boils.

Carbuncles—Generally appear at the side or back of the neck; they indicate general debility, and are more common to the old than the young. They are much more serious than simple boils, and require for their successful treatment the skill and care of the surgeon.

Acne, Pimples, Flesn Worms.—A small red spot appears on the skin singly or in a group with others; it becomes yellow, and on being squeezed emits a white plug. These are not serious in themselves, but as they frequently appear on the face they are highly disagreeable. They are generally due to vitiated blood, from an over rich diet, or an indulgence in alcoholic drinks; but sometimes they are symptomatic of diseased liver and kidneys.

Worms.—Three kinds of worms find their way to the human intestines with the food that we consume, viz: the round-worm, thread-worm and tape-worm.

The Round-Worm—Is the most common, especially with children. Saccharine substances, such as fruits and sweetmeats, taken in excess and with a neglect of salt, are favorable to their growth in the human system. They occupy the smaller bowels, just beneath the stomach, and their presence in the intestines is necessarily very injurious to health. Symptoms: Feverishness, fickleness of appetite, headache, and the tickling of the nose, which so often induces children to be "picking at the nose." If not quickly checked the worms will produce severe irritation of the bowels, nausea, distressing cough, insomnia and (in children) severe spasms. Treatment: An ounce of table-salt dissolved in a glass of water drank right down will often expel these worms. For children this method is scarcely practicable. Give a child of seven years one grain of santonine, followed by a half teaspoonful of fluid extract of spigelia. These remedies are more effective after a fast of twelve hours, and should be followed by a dose of eight grains of rhubarb, or a half teaspoonful of fluid extract of senna. For older children and adults the doses must be proportionately increased.

The Thread-Worm—Or pin-worm, finds its place in the lower portion of the rectum and creates an intolerable itching and uneasiness. Treatment: Give a strong dose of castor oil, magnesia, senna or rhubarb, and when purging is induced, inject an infusion of lime, salt, or best of all, *quassia chips*.

The Tape-Worm—Finds its way to the human intestines in uncooked or half-cooked meat of any kind; probably in the chipped beef and raw ham, which is so frequently eaten. Sausage meats are fruitful sources of the same mischievous pests. It must be got rid of, at all costs, as one tape-worm will shatter the constitution of a strong, vigorous man and keep him in misery for years; it sometimes grows to an enormous length if not early expelled, and it then becomes exceedingly difficult to dislodge. The early symptoms are not always very decisive, but later on become intolerable. Insatiable appetite, cramps, fever, languor, pains everywhere, are sure tokens. Treatment: For a

child, half an ounce of oil of turpentine; for an adult, one ounce. If this is not successful in discharging the worm, a careful course of treatment with pumpkin seeds and cathartics, or with male-fern and pomegranate bark should be carried out under the supervision of a physician. Fasting before and after treatment is a necessity to a successful result.

Piles or Hemorrhoids.—These distressing malformations of the lower part of the rectum frequently occasion great inconvenience and intense pain. If allowed to grow unchecked they will increase to an enormous size, and produce an intolerable irritation of the whole system. They may arise from a sedentary life, congestion of the liver, highly seasoned and rich foods, free indulgence in alcoholic drinks, and also from the abuse or excessive indulgence of the sexual organs. Treatment: Total abstinence from alcoholic drinks, plenty of walking exercise in the open air, strict regimen in diet, careful regulation of the bowels, and such remedies as will restore the vitality of the liver and kidneys. Avoid riding, jolting, and all shocks to the system, and if a thorough trial of the local application of the ointment of stramonium does not effect a cure, submit cheerfully to the surgeon's knife.

Colic.—An intense pain in the regions of the navel and lower bowel, with griping and a contraction of the muscles of the lower abdomen. The causes of this complaint are numerous; sometimes it is due to poisoning, as in painter's colic (due to lead poisoning), but more generally due to the drinking of large draughts of cold liquids on an over-heated stomach; the eating of unripe fruit (especially plums), or indigestible vegetables, or to the prevalence of cold in the feet or bowels. Treatment: Free doses of castor oil should be given on the first symptoms of this complaint, so that any offending substances may be thoroughly expelled. Any subsequent treatment must depend upon a copious evacuation of the intestines.

Diarrhœa.—Generally due to sudden changes of temperature; over-exhaustion; exposure to extreme heat or malarial

atmosphere; the eating of unripe or unsound fruit and often to indigestible vegetables (such as cucumbers, etc.). It is common to all climates, but most prevalent, severe and injurious in warm climates or in hot seasons. It prevails in most parts of the United States, and produces great depression of the vital forces. Treatment: If the disorder be due to any irritant in the stomach or the bowels, mild aperients should be given until the irritating cause is removed; if to heat of atmosphere, undue exposure, or exhaustion, a simple diet with rest and sound sleep and quiet will restore to health; if it be due to marshy exhalations or bad local atmosphere, a change of climate to a pure bracing air is imperative for recovery.

Cholera Morbus.—The symptoms of this destructive complaint are severe cramps in the bowels, vomiting and purging, and they most frequently appear during the night in hot weather. The causes are much the same as in diarrhœa, and the treatment must be substantially the same; *i. e.* expel all offending subtances as quickly as possible, then do your best to induce free perspiration and sound sleep.

Stitch in the Side.—The cause may be slight or serious; it may be due to the disorders of the digestive system, or it may result from inflammation of the pleura. If the former, attend to the general health; if the latter, stop all exercise that provokes the pain, and at once put yourself under medical treatment.

Jaundice.—Take of allspice one ounce; flowers of sulphur, one ounce; turemric, half an ounce; pound them well together and stir them thoroughly into half a pound of treacle. Two tablespoonfuls may be taken every day.

Gout and Rheumatism.—The following is the prescription for a valuable internal remedy for gout. Wine of colchicum and spirit of nitrous ether, one ounce of each; iodide of potassium, two scruples; distilled water, two ounces; mix well and take a teaspoonful three times a day in chamomile tea.

Pills for Gout and Rheumatism.—Acetic extract of colchicum, two grains; powdered ipecacuanha, four grains; compound

extract of colocynth, half a drachm; blue pill, four grains; divide into twelve pills and take one every morning and evening.

Acute Rheumatism or Rheumatic Gout. — Take saltpeter, sulphur, mustard and turkey rhubarb, half an ounce of each, and of powdered gum guaiacum, one quarter of an ounce. Mix well together and dissolve one teaspoonful in a wine-glassful of pure cold water (the water should have been boiled); to be taken every night for three nights, then miss three nights, then take again for three nights and so on till cured.

Valuable Lotion for Rheumatism, Lumbago, Sprains, Bruises, Chilblains and Bites of Insects. Take one raw egg, well beaten; half a pint of vinegar; one ounce of spirits of turpentine; a quarter of an ounce of spirits of wine, and a quarter of an ounce of camphor. Mix the ingredients well together, then put them in a bottle and shake them for ten minutes. The bottle must be tightly corked to exclude the air. The lotion will be ready for use in half an hour, and must be well rubbed in, with the naked hand, on the part affected. For rheumatism in the head, rub the lotion in at the back of the neck and behind the ears as frequently and as long as it can be borne. *Caution.* — This lotion must not be used for broken chilblains, nor on any broken surface of the skin.

Another Remedy for Sprains. — Put the white of an egg into a saucer, stir into it a lump of alum until it becomes a thick jelly; dip a piece of lint large enough to cover the sprained part into the jelly and apply it to the part affected; change the lint for a fresh piece as often as it becomes warm or dry; keep the limb in a horizontal position.

Flour Cure for Burns. — A simple covering of common white flour makes the best application for burns. The moisture which exudes from the burn is absorbed by the flour, and it forms a paste which entirely shuts out the air. This covering may be washed off when it becomes very dry and a new coating of flour applied. This simple remedy produces most astonishing results.

Ointment for Freckles. — Dissolve one ounce of Venice soap

in half an ounce of lemon juice, and add to it a quarter of an ounce each of oil of bitter almonds and deliquiated oil of tartar. Place this in the sunshine till it becomes an ointment, then drop in three drops of the oil of rhodium and keep ready for use. Apply the ointment at night.

SIMPLE SURGERY FOR INJURIES ARISING FROM ACCIDENTS.

No attempt will be made in these pages to deal with that large class of surgical cases which require a knowledge of the anatomy of the human body; wounds, dislocations, broken limbs, severe sprains and those nervous shocks to the human system which so frequently result from railway accidents, runaway accidents, toboggan slides; — all require surgical care and skill, and it is only in very exceptional cases that an untrained person or an amateur at surgery is justified in attempting to deal with serious cases of this character.

Cuts. — Boys and even men are so prone to inflict cuts and wounds when dallying with edged tools that every household should be supplied with a roll of linen rags or cotton lint; a spool of thread and a pair of fine tweezers or forceps, in readiness for any emergency. A roll of adhesive plaster should be always on hand. In ordinary cuts a slight pressure upon the artery involved and the application of cold water will suffice to stop the bleeding while the dressing and bandage are applied. All that is necessary is to gently press the edges of the cut closely together, bind them with adhesive plaster, and put on a sufficient bandage to prevent any disturbance of the wound and keep out the air and all particles of dust and dirt.

Stabs, etc. — Punctured and incised wounds are easily healed if no artery has been severed. A pad or plug of fine lint applied to the wound, and a cold water compress covering the parts around the wounded surface, will give nature all the assistance she requires.

Torn Flesh. — In cases where from any cause the flesh has been lacerated the main points are, to sponge out any dirt or

foreign substances; press the torn parts gently but firmly together; to secure them with adhesive plaster, and to keep down inflammation by the use of compresses wrung out of iced water.

Bruised Nails. — Accidents are frequently occurring by which some of the nails of the hands or feet are badly bruised, causing intense pain to the sufferer; to relieve the pain and assist nature in casting off the injured nail, put the hand or foot into water as hot as it can be borne and keep it there until the pain subsides; then apply a dressing of lotion of rhus toxicodendron, arnica or iodine. The first is the best.

Fish Bone, wheat beard, or other foreign substance in the throat. It frequently happens that while in the act of swallowing, a fine fish bone becomes lodged in the mucous membrane of the throat; this must be removed or violent inflammation will ensue. The same result follows to farmers and others who in threshing out bearded grain allow the beard or spear of the grain to enter their throats. The treatment to be adopted is to draw out the tongue and depress it so as to get a view of the foreign substance, if possible, and then with a pair of tweezers or fine scissors to draw out the bone or beard. Care must be taken not to break it off and leave the point in the throat. If the bone or beard cannot be seen it may be coughed up; take a heavy pinch of snuff, as the act of sneezing may dislodge the bone; or, inhale cayenne pepper until it excites a fit of coughing, which may throw up the intruding substance; sometimes the swallowing of thick, glutinous substances, beaten eggs, or treacle posset, may carry down the beard or bone. But at whatever cost it must be got rid of.

Foreign Substance in the Eye. — Passengers on the railway cars frequently get particles of grits lodged under the eyelids and in other ways the same result ensues with dust or hairs.

Caution. — Do not rub the eye, either with the finger or the handkerchief, as that may make the injury far greater than it would be. Treatment: Get a firm hold of the eyelash of the

upper lid, draw the lid gently but firmly out from the eyeball, then draw it down over the lower eyelash, and the offending substance, if not stuck into the lining membrane, will most probably be brushed off onto the lower lash. If this does not succeed get a friend to roll back the eyelid and examine it in a clear light. If the offending substance can be seen it may be drawn out with a pair of fine tweezers. If this fails surgical aid may have to be obtained, without any delay.

Foreign Substance in the Nose. — Children often put some object up in the nostril, which becomes lodged there. Treatment: Use snuff or pepper to make the child sneeze it out if possible. If this does not succeed try to dislodge it and draw it down with a fine hairpin. If you fail send for the doctor.

Foreign Substance in the Ear. — Insects in the ear may be dislodged by pouring sweet oil into the ear, the head being laid flat on the sound side. Peas, marbles, etc., may be washed out by a sharp jet of water syringed into the ear. *Caution.* — Do not probe at the tympanum with any hard substance, or the results may be very serious.

Fish-hook in the Flesh.—Do not wriggle the hook about, as that increases the laceration. Move the hook gently but firmly back to the point at which it entered, and if necessary, make a small incision to set the barbed end of the hook free. Wash the wound and bind it up with strips of plaster.

Thorn, Splinter or Needle in the Flesh.—Avoid probing at the visible end, or you drive it deeper; if the end is free the object may be withdrawn with tweezers; if not, grasp the surrounding flesh firmly between the thumb and forefinger and press it forcibly up to a mound shape; this will probably bring the point to the surface, so that it may be grasped with a pair of fine tweezers; if not, an incision must be made to enable you to get hold of the end.

Felons, Whitlows, etc.—Laundry women are very subject to to this painful affliction; excision with the surgeon's knife is the only radical remedy. If not too near a joint they may be cut

out by any person of ordinary nerve and skill. They may become very dangerous if neglected.

Ingrowing Toe Nails.—Small shoes which cramp the feet frequently force the point of the nails downward and inward. Soak the feet in warm water and soap them well around the nails; this will soften the nail; then with a sharp knife pare back the center of the nail, and if necessary put the least bit of cotton wool dipped in olive oil under the edge of the nail; this will prevent its adhesion to the flesh, and make it grow upward in a graceful curve.

Corns—the result of wearing tight boots.—Soft corns may be cured with extract of lead, hard corns painted on and close round the edge of the core with strong acetic acid may be completely extracted. Paring is of no use: the core must be extracted. Easy shoes which give freedom for the toes to expand in walking will insure freedom from this pest.

Bunions.—Due to forcing the joint of the great toe out of its proper place so as to open one side of the joint and leave the other tight shut; the matter which escapes forms the morbid growth. Paint the bunion with tincture of iodine every night, and wear a small piece of sponge soaked in oil between the great toe and its neighbor. This will restore the joint to its place.

Warts.—Touch the points once or twice a day with lunar caustic; or paint with nitric acid (for quick results), or with chromic acid (for painless cure).

Bee Stings.—Extract the sting *carefully;* suck the wound; and rub on hartshorn, sweet oil, the open side of an onion cut in half, or the bluebag used in the laundry.

RESTORATION OF PERSONS WHOSE LIVES ARE ENDANGERED BY DROWNING OR POISONS.

The exclusion of air from the lungs and consequent asphyxia is the immediate cause of death to persons who are drowned, hanged or suffocated. The primary object in dealing with drowned persons is to induce respiration, for though this function of life has apparently ceased the lungs may be induced to

resume their normal action; and if one inspiration or expiration can be produced the patient may be restored to the exercise of all the functions of human life, unless death should ensue from other causes, such as shock to the nervous centers. To induce respiration the water must first be expelled from the chest and stomach. To effect this place the patient on the ground, face downward, place a good pile of pillows, etc., under the stomach, and press the hands over the back and spine (specially the lower part of the back) to force the water out at the mouth.

The water having been expelled place the patient on his back, put a roll under the shoulders so as to raise the chest six or eight inches; take the depressed head of the patient gently between your knees, flex the forearms of the patient on the chest; grasp the upper arms of the patient in your two hands just above the flexed elbows, and work the upper arms firmly against the ribs and sides of the chest. Continue this first movement for a few seconds, counting deliberately one, two, etc., while you knead the chest of the patient with his elbows. Inflex the elbows, draw the arms gently, firmly backward until they are extended at full length above the head of the patient, and hold them in this position while you count as before, one, two; then return to the first movement for the same period; then to the second movement and so on. This imitation of natural respiration may induce the lungs to resume their functions; it must be continued at the rate of about fifteen times per minute until natural respiration is induced or all hope of resuscitation is lost. Patients have been resuscitated after three or four hours of such persevering effort, and hope should not be too quickly abandoned.

Another successful movement is as follows: The water having been expelled, place the patient on his back with a good roll of something under the small of the back; extend the arms at full length back over the head, tie the hands firmly together; press heavily upon the chest and epigastrium by a forward motion, throwing the weight of the body on to your hands, and thus raise yourself back so as to allow the chest of the patient to expand by its own elasticity.

When respiration has been restored attention must be directed to the circulation of the blood; brisk rubbing with the hands or with rough towels will soon restore the natural warmth, and as much nutritious food should be given as can be taken with safety. Suffocation requires the same general treatment, with the addition of the occasional sprinkling of the body with cold water.

Poisoning.—The administration of poison to the human stomach may be due either to ignorance, mistake or suicidal intention. Poisoning in mines by coal gas or foul damp, and in wells, is generally due to accident or bad judgment. In the latter case as a rule little can be done beyond the treatment already prescribed for the restoration of persons drowned or suffocated; with this exception: Persons poisoned by carbonic acid gas should be treated with small doses of tincture of aconite, one drop at a time, often repeated. Persons poisoned by coal gas should be dosed with liberal draughts of vinegar and water at short intervals. Poisons that naturally produce free vomiting will require but little special attention. Poisons that that do not promote vomiting require the immediate administration of some powerful emetics and the use of artificial means, such as tickling the mucous membrane of the back part of the throat with a feather, until complete evacuation of the contents of the stomach is insured. Poisons that paralyze the stomach (such as opium) demand the prompt and vigorous use of the stomach pump, which should never be used by anyone but an experienced operator, as serious injury to the vital organs may ensue from inexperience. The appropriate antidotes for all the principal poisons in use and the methods of applying them are given in the subjoined table.

TABLE OF THE PRINCIPAL POISONS AND THEIR ANTIDOTES.

POISONS.	ANTIDOTES.
For arsenic, "white precipitate," "ratsbane" or Paris Green.	Emetics, followed by free use of hydrated sesqui, oxide of iron, chalk or magnesia, and castor oil.

For lead-poisoning, corrosive sublimate, red precipitate, vermilion, saltpeter, white vitriol, blue vitriol, chloride of zinc.	Emetics, followed by copious draughts of sweet milk and white of egg, sweet oil, and mucilaginous drinks.
For lye-poisoning, strong ammonia, caustic soda or caustic potash.	Free doses of vinegar or lemon juice, oil or warm lard with white of egg, followed by mustard or ipecac, in warm water.
For nitrate of silver or lunar caustic.	Moderate use of strong solution of common salt, vomiting followed by plenty of sweet milk.
For nux vomica, strychnia, and its salts.	An emetic followed by tannic acid and chloroform.
For carbolic acid or creosote.	Olive or castor oil freely administered.
For oxalic acid, sulphuric, nitric or muriatic acid.	Soda, chalk, lime, calcimine, ammonia or other alkali, followed by oil and emulsions.
For opium, laudanum, morphia, aconite, belladonna, digitalis, stramonium, etc.	Emetics, cold applications to shock the nervous system, strong coffee; with opium and opiates, keep patient constantly moving; with the rest, maintain recumbent position; head low, to induce flow of blood to the brain.
For iodine.	Starch, followed by an emetic.

For sugar-of-lead poisoning.	Alum and carbonates of soda or potash in plenty of water, followed by sulphate of zinc, to induce vomiting.
For tartar emetic (antimony).	Strong tea or tannin in water; warmth to hands, feet, spine and pit of stomach, small doses of diluted brandy.
For phosphorus, vermin paste, match heads, etc.	Blue vitriol in large quantities to empty stomach, hydrated magnesia to purge, and French oil of turpentine, or, experimentally, the American crude oil.
For alcohol.	Cupping, exercise, hot coffee, and aromatic spirits of ammonia.
For prussic acid, oil of bitter almonds, cherry laurel, cyanides, etc.	Ammonia (diluted) followed by oxide of iron; artificial respiration if necessary, and stimulants.

CHEMISTRY OF THE CEREALS.

The cereals, five of which enter mainly into the commerce of the world, with their two congeners, rice and buckwheat, contain all the elements essential to human nourishment. The same organic, and essentially the same mineral elements in varying proportions, exist in them all. Taking wheat as the standard, an average analysis of a large variety of the wheats of the world gives the following results in percentages: Water, 14; albuminoids, 14.6, of which 12.8 are insoluble gluten; starch, 59.7; gum and sugar, 1.7; cellulose, 1.7; oil, 1.2; and mineral matter, 1.6. The latter is mostly connected with the outer bran coatings of the grain or the cellulose, and does not enter to a

great extent into our modern bread. Something less than one-half of these mineral elements is phosphoric acid, and a little less than one-third is potash; there being, besides iron, soda, lime, magnesia, etc., in small quantities. These are essential to the growth and nourishment of the bony tissues and the blood, but any deficiency from the elimination of the bran is more palatably supplied from their abundant store in the various vegetable foods that are naturally craved.

Starch, as is seen, occupies the largest space, commensurate with its importance as fuel or a force-producer, and in the complex peptonic changes of the processes of digestion. Though the starches of different grains and vegetables, such as the potato, arrowroot, sago, etc., of which it is the main constituent, differ in the form of cells and qualities from each other, the presence of any of them may be shown by adding a small quantity of iodine to a watery mixture, which will immediately turn blue. The amount of the natural gum and sugar of the grain is small, but they are readily increased by the fermentive changes of the starch, from which sugar, dextrine, alcohol and carbonic acid are formed, with the accompanying evolution of force. The albuminoids are the muscle-forming element of our food, and are most essential, but in much smaller proportions than the others; while in their consumption in the human economy they go largely to the production of heat, being required for repair of tissue in only small quantities when the other elements are fully supplied.

A very small amount of nitrogenous nourishment, combined with fat, will keep in a healthy working condition the most severely taxed laborers. The albumen of grain resembles that in the egg, and is soluble. The insoluble gluten is the more important nitrogenous element of wheat, giving it mainly its excellent bread making value. The oil of wheat is mainly found in the germ, which the best modern processes discard from the flour because of its ferment, injuring its keeping as well as its bread-making value. But this, too, in butter and

animal fats as well as other vegetable oils, is abundantly supplied in other ways. The knowledge of these elements and their modes of assimilation by the growing plant is of the greatest importance to the grain grower, if he would meet with the highest success.

FOODS AND THEIR CONSTITUENT ELEMENTS.

	Grains Per Pound.		
	Carbon.	Nitrogen.	Value per lb.
Split peas	2699	248	2 cts.
Indian meal	3016	120	2 "
Barley "	2563	68	2 "
Rye "	2693	86	2½ "
Oat "	2831	136	4 "
Baker's bread	1975	88	3 "
Pearl barley	2660	91	4 "
Rice	2732	68	4 "
Potatoes	769	22	1 "
Turnips	263	13	1 "
Green vegetables	420	14	1 "
Carrots	508	14	1 "
Parsnips	554	12	1 "
Sugar	2955		5 "
Treacle	2395		2 cents.
Butter milk	387	44	1 "
Skimmed "	438	43	2 "
New "	599	44	4 "
Mutton	1900	189	10 "
Beef	1854	184	16 "
Fat Pork	4113	106	14 "
Dry bacon	5987	95	14 "
Green "	5426	76	12 "
Suet	4710		12 "
Lard	4819		10 "
Salt butter	4585		12 "
Fresh "	6456		10 "
Cocoa	3934	140	8 "

CHAPTER XXXIII.

THE INTER-STATE COMMRECE LAW.

THIS law which came into effect April, 1887, applies to any common carrier, or carriers, engaged in the transportation of passengers or property, wholly by railroad, or partly by railroad and partly by water, when both are used, if under a common control, management or arrangement.

The bill does not apply when the conveyance is entirely within one state.

The term "railroad" includes bridges and ferries, and "transportation" all means of shipment or carriage.

All special rates, levied directly or indirectly, are by it forbidden. The bill is framed to shut out the possibility of any device being adopted by rebates, drawbacks, or otherwise, to avoid its effects.

Any undue or unreasonable preference, or advantage, to any particular person, company, firm, corporation, or locality, or any particular description of traffic, is forbidden.

Equal facilities for the interchange of traffic between different lines must be given.

Shorter distances must not be charged more than longer ones; but, upon application to the commission appointed under the act, authority, in certain cases, may be obtained to charge less for longer than for shorter distances for the transportation of passengers or property.

Agreement between carriers for the pooling of freights of different and competing railroads is rendered illegal by the bill.

Schedules must be printed and publicly exhibited showing rates, fares and charges; and these can only be altered after ten days' notice of the change.

Every common carrier must file with the commission copies of these schedules.

Carriers must not, by any device, prevent the carriage of freight from being, and being treated, as one continuous carriage.

For violation of the law, the carrier becomes liable to the person or persons injured in damages, including an attorney's fee.

Persons injured may either complain to the commission at Washington, or take action in any District, or Circuit court of the United States, of competent jurisdiction.

Any infraction of this act, either directly, indirectly, or by aiding and abetting, is constituted a misdemeanor, and renders the offender liable to a fine of not more than $5,000 for each offense.

The commission appointed under this bill is composed of five members appointed by the President, and entered office January 1, 1887.

Each commissioner receives an annual salary of $7,500; their secretary receiving $3,500.

Nothing in the Inter-state Commerce bill applies to the carriage, storage, or handling of property, free or at reduced rates, for the United States, or municipal government; or for charitable purposes; or to or from fairs or expositions; or to the issuance of mileage, excursion, or commutation passenger tickets. Reduced rates may be given to ministers of religion. Employés of the railroad may have free carriage on the different lines as arranged for them by the principal officers.

CHAPTER XXXIV.

LEGAL MAXIMS AND FORMS.

A KNOWLEDGE of some simple facts in law would often add to a man's mental comfort, as well as save him time and money. In many matters there is no more necessity for one to run off to a lawyer for advice, than there is to take a cut finger to a surgeon. From ignorance of elementary facts there are many who suffer bewilderment and disquietude, and render themselves liable to be placed in false and foolish positions, whilst on the other hand, by having a few forms beside them regarding affairs which enter commonly into our lives, they may be enabled to do for themselves at no cost at all and with little trouble what otherwise is often a source of expense and worry. Everything connected with the legal profession is apt in the popular mind to be associated with difficulty and a certain dread. No doubt there are many occasions, when it is advisable to place oneself in the hands of a reliable lawyer, just as when a serious illness overtakes a man the wisest plan is at once to call in the experienced physician; but is astonishing how seldom, in the majority of cases, either the doctor or the lawyer is a necessity in a man's life. There are some, indeed, who do not seem able to content themselves unless they are engaged in litigation, but common-sense people place a higher value on their time and money.

The following rules and statement of facts, then, should be carefully noted.

GENERAL MAXIMS.

When a matter in dispute can be settled at even some sacri-

fice of feeling, or a claim adjusted by a moderate abatement of one's demands, it is better to make such a sacrifice than to go to law.

When recourse to law cannot be avoided, it is always best to employ a thoroughly qualified practitioner in good standing. Here as elsewhere the best is, in the long run, the cheapest.

In business dealings even with friends, it is best, from every point of view, to observe strict business forms.

Friendly understandings in business matters, are the prolific source of misunderstandings, estrangements, and loss.

Threats of legal proceedings should not drive any one to inconsiderate action. As a rule the man who threatens has a weak point about himself or his case.

No man should go to law for a sentiment.

Unless there is a reasonable certainty of clear gain, either in money, reputation, or otherwise, it is better to settle matters out of court. The present loss is often the smallest.

The law is a costly rod to beat an enemy with.

FACTS TO MAKE FAMILIAR

Written instruments are to be construed and interpreted by the law according to the simple, customary, and natural meaning of the words used.

No evidence can be introduced to contradict or vary a written contract, but it may be received in order to explain it, when such evidence is needed.

A receipt for money is not always conclusive.

Signatures made with a lead pencil are held good in law.

A note made on Sunday is void.

A note by a minor is voidable.

A note obtained by fraud, or from a person in a state of intoxication, cannot be collected, unless it falls into the hands of an innocent party.

If the time of payment of a note is not named, it is payable on demand.

Value received should be written in a note, but, if not, it may be supplied by proof.

The payee should be named in a note unless payable to bearer.

The time of payment of a note must not depend on a contingency. The promise must be absolute.

The maker of an accommodation bill or note is not bound to the person accommodated, but is bound to all other parties, just as if there was a good consideration.

Checks or drafts should be presented without unnecessary delay, and during business hours, although this is only compulsory in the case of banks.

If the person on whom a check or draft is drawn has changed his residence, the holder must use due and reasonable diligence to find him.

If you pay a check over to a third party, you have a right to insist that it be presented on that day or the day following.

An indorsement of a bill or note may be written on the face or back.

An indorser may prevent his own liability to be sued by writing *without recourse*, or similar words.

An indorsee has a right of action against all whose names were on the bill when he received it.

A note indorsed in blank (the name of the indorser only written) is transferable by delivery, the same as if made payable to bearer.

If two or more persons, as partners, are jointly liable on a note or bill, notice to one of them is sufficient.

The finder of negotiable paper, as of all other property, must make reasonable efforts to find the owner, before he is entitled to appropriate it to his own benefit. If the finder conceal it he is liable to the charge of larceny or theft.

Principals are responsible for the acts of their agents, performed within the scope of their authority.

The acts of one partner bind all the rest.

Each individual in a partnership is responsible for the whole amount of the debts of the firm, except in cases of special partnership.

A contract made with a minor is voidable.

Contracts made on Sunday cannot be enforced.

Ignorance of the law excuses no one.

The law does not require one to do impossibilities.

LEGAL FORMS.

Blank forms of a deed, lease, a mortgage, etc., may be procured at a stationer's.

In filling out blanks or making complete papers, care must be taken to write everything plainly and state it clearly.

An *Agreement* is a document wherein individuals singly or collectively bind themselves to perform certain duties *within a specified time.* It should be clear on every point and incapable of bearing two constructions. To make it valid at law there must be a lawful consideration. It should be signed by a witness, who, however, need not know its contents. It is safest to execute it in ink. In case of fraud or misrepresentation, on either side, the contract is void. Each party to an agreement should possess a copy.

An *Acknowledgment* is a written statement, made before a competent legal authority, admitting the validity of any document to which it is appended.

Any one executing a deed for land or a mortgage is by law required to give such an acknowledgment, in order that the document may be recorded.

In the case of married persons, husband and wife must make a joint acknowledgment, and, in some states the wife must make her voluntary and separate acknowledgment.

An *Assignment* may be either in words, when at the same time whatever is so assigned must be handed over, or it may be in writing. It is simply the transference of a right to property. The assignor is the party making over his title, and the assignee is the individual receiving it.

Transfers in real estate must be in writing. The expressions used in making an assignment are "assign, transfer and set over," but, "give, grant, bargain and sell" are valid. An assignment may either make over property absolutely or in trust. When for the benefit of creditors it may be made at common law, in which case creditors may be given a preference; or by statute, when they may not. All property assigned must be distinctly described in the assignment, or in the schedule attached thereto.

Bail is the undertaking of one or more persons to satisfy the civil authority, in the case of some person who is charged with breaking the public law. A sum of money is usually engaged to be paid by the bailor, in security for the appearance of the accused before the court at the proper time; the latter, on bail being given, is released from custody.

A *Bill of Sale* is a document by which personal property is made over, in right, title, and interest, by one party to another. This form frequently gives rise to fraud, as when a man desires thereby to escape the payment of his just and legal debts, and juries have the power to test the validity of such bills.

A *Bona* is an admission in writing of the individual granting it, who is termed the obligor, of an obligation, in virtue of which he undertakes to pay a certain sum, at a time specified for a real consideration. The penalty attached to the bond is usually sufficient to cover debt, interest and costs. It is generally fixed at twice the amount of the real debt. The obligee is the person to whom a bond is given.

A *Deed* is an instrument in writing by which lands and appurtenances thereon are conveyed from one party to another, signed, sealed, and properly witnessed. The acknowledgment of a deed must be made before a competent legal official, such as justices of the peace, notaries, judges, and clerks of court, etc. Some states require two witnesses, some one, some none. A deed to be valid must be for a realty for which a sufficient consideration is given.

A *Mortgage* means literally a *dead pledge*, because the property pledged becomes lost, or dead, to the person who executed the mortgage, in event of his not fulfilling its conditions. In law it is the conveyance of property, personal or real, as security for the payment of a debt, or as a guaranty for the performance of some certain duty. The mortgageor is he who pledges his property, and the mortgagee is the person to whom it is pledged. A mortgage must, like a deed, be *acknowledged*.

Patents give exclusive property in inventions to the inventors, their heirs, etc. The right of property exists within the United States and territories, and extends over a period of seventeen years. Applications for patents are made to the commissioner of patents, Washington, D. C.

A *Will* is the declaration according to law of how any competent individual wishes to bequeath his property after his death. Married women, in some states, are debarred from bequeathing their property as they may elect, without the consent of their husbands. No precise form of words is obligatory in law, but the greatest care should be taken to give such a description of the testator (or testatrix) and of the party, or parties, to whom the whole, or any part, of the property is being left, that no doubt or difficulty may arise in proving the will. There are such things as verbal or *nuncupative* wills; but they are extremely unsatisfactory, generally resulting when the property is of value in expensive litigation. They are therefore to be avoided. A will made by an unmarried woman is legally revoked by marriage, and, similarly, if a man has not otherwise provided for his wife and children, an antenuptial testament is considered in law as revoked. The person named in the will to administer it is called the executor, the nominee of the court the administrator.

The testator's name should be written in full at the end of the will. If he be unable to write, his hand may be guided in making a mark opposite his name.

Witnesses should add their address to their signatures, which should be written in presence of each other and of the testator.

The following states require *two* witnesses: Illinois, Missouri, Ohio, Kentucky, North Carolina, Tennessee, Iowa, Utah, Texas, California, New Jersey, Delaware, Indiana, Virginia, Oregon, Minnesota, Michigan, Wisconsin, Rhode Island, Louisiana and New York.

Three witnesses are required in Florida, Georgia, Maryland, Mississippi, South Carolina, Connecticut, Massachusetts, Maine, New Hampshire and Vermont. In Philadelphia two reputable witnesses on oath can establish the signature of the testator. Witnesses are not required to know the contents of the will.

A *Codicil* is an addition to a will previously executed. It explains, modifies, or changes previous bequests, and should be executed with the same scrupulous care as the will itself.

JURORS.

A juror must be resident in the county and not exempt from serving on jury; between the ages of twenty-one and sixty; of fair character; in the possession of natural faculties; free from legal exceptions; of sound judgment; well informed, and who understands the English language.

The following are generally exempt from serving on juries: The governor, lieutenant-governor, secretary of state, auditor of public accounts, treasurer, superintendent of public instruction, attorney-general, members of the general assembly during their term of office, judges of courts, clerks of courts, sheriffs, coroners, postmasters, mail carriers, practicing attorneys, all officers of the United States, officiating ministers of the gospel, school-teachers during school terms, practicing physicians, constant ferrymen, mayors of cities, policemen, and active members of the fire department.

COST OF COLLECTING A DEBT BY LAW.

A lawyer in an ordinary justice suit will charge for an hour $5. A large debt and more time will bring his bill up to from $10 to $20. The losing side pays the greater part of the cost.

An ordinary justice suit, without witnesses, lawyers, or jury,

entails an expense of $3.40. Witnesses cost 50 cents each per day, and about 75 cents each of expense to secure their presence. In a suit before a justice, when there is a jury, each juryman is entitled to 50 cents for hearing the case, should the jury agree; and other expenses amount to 75 cents. An appeal to a higher court costs $1.10 where the expense will run from $20 to $50.

AMOUNT OVER WHICH A JUSTICE OF THE PEACE HAS JURISDICTION.

Fifty dollars in Virginia; $100 in Alabama, Connecticut, Dakota territory, Delaware, Florida, Georgia, Idaho territory, Iowa, Louisiana, Maryland, Minnesota, New Hampshire, New Jersey, New Mexico territory, Rhode Island, South Carolina, Washington, West Virginia, Wyoming territory; $150 in Mississippi; $200 in Illinois, Indiana, Nebraska, New York, North Carolina, Texas, Vermont; $250 in Oregon; $300 in Arkansas, California, Colorado, Kansas, Massachusetts, Michigan, Missouri, Nevada, Ohio, Pennsylvania, Utah territory, Wisconsin; $500 in Tennessee.

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FORM OF NOTICE TO QUIT FROM LANDLORD TO TENANT.

SIR: I hereby give you notice to quit the house and appurtenances, situated at No. —, which you now hold of me on or before .... next.

Dated........ 18..

Signed...................... (landlord.)

FORM OF NOTICE FROM TENANT TO LANDLORD.

SIR: I hereby give you notice that on or before the...... day........of........next I shall quit and deliver up possession of the house and premises I now hold of you, situated......... in the town of........in the county of.........

Dated this....day of......18..

To .... Witness ....

FORM OF A RECEIPT FOR RENT.

CHICAGO, March 1st, 18..

Received of..........the sum of......in full for rent of (state premises) for the month (or quarter) ending......18..

(Signature).............

USURY LAWS.

There has been a strong feeling against the taking of usury (or exorbitant interest whether in money, service or goods) through all the centuries of the Christian era, and in almost all countries. So far as Christian communities go this abhorrence was intensified by the language of Holy Scripture and the

authority of the church. It is now, however, a settled matter among political economists, and all accurate, well-informed thinkers, legal and others, that laws against usury are bad in themselves and harmful in their operation. Those whom it is their intention to benefit and protect are only injured by their operation, as they are either driven to ruin from being unable to borrow money at the legal rate, which is not sufficient to cover the risk, and which, therefore, those who have it to lend will not part with; or they are driven into dealing with unscrupulous men whose charges are *usurious* all the more that they are acting in defiance of the law. It is astonishing that so simple a matter should have so long clouded the intelligence of the commercial world; but when religion is permitted to invade economic questions *in a wrong way,* there is no end to confusion and difficulty. The history of usury is a very interesting and instructive one, and "very curious and quaint are some of the old cases reported in the books concerning that detestable sin of usurie," for which our ancestors were freely introduced to all the pains and penalties attached to the statutes, enforced with all the bitterness approved by the prejudices of the time.

The passages in the Bible which refer to this subject are the following: Leviticus: "Thou shalt not lend upon usury to thy brother. Take thou no usury of him, or increase, but fear thy God, that thy brother may live with thee. Thou shalt not give him thy money upon usury, nor lend him thy victuals upon increase." Deuteronomy: "Thou shalt take no usury of thy brother." Psalms: "Lord; who shall dwell in thy tabernacle? or who shall rest upon thy holy hill? . . . He that hath not given his money upon usury, nor taken reward against the innocent." This prohibition seems as strong as could be, but it must be remembered that usury here is equivalent to what we call *interest,* and not only exorbitant interest, or usury; and that, whilst such an enactment suited well enough in a *theocracy* such as the Jewish community was, it is not either wise or economically just in modern times. Indeed, it would be quite as

valid to contend, and more so, that the Bible teaches communism, as to insist on this matter of the divine prohibition of interest on loans.

In addition it may be said that credit, on which the gigantic commerce of the world depends, is altogether a modern thing, and that loans on interest are essential to its existence. Unless money can be borrowed trade cannot be carried on; and if no premium be allowed for the hire of money, few persons will care to lend it, or, at least, the ease of borrowing at "short warning, which is the life of commerce," will be entirely at an end. "Few, if any, will care to risk their means in the speculations of another unless a reward commensurate with the hazard run is held out. The hazard of the loss must have its weight in the regulation of interest. If this be true—and to prevent borrowing is to prevent trade—then, though in a less degree, to *permit* borrowing, but only at a rate of interest below the actual market value of money, is to retard the progress of business; for it drives the capitalist who respects the laws, or fears its penalties, from the markets, and, by withholding the current, 'which turns the wheels of trade,' limits the productive power of the capital and industry of the country."

The following, then, are now received axioms among intelligent business men: Compensation must be proportioned to the risk. Money has a value besides that contemplated by law; and which the law can never fix, namely, a *market value.* Money, like water, will always find its own level. Free trade in money is the only way of rendering it abundant.

In England, there are practically now no laws against usury; but it is otherwise in the United States.

The following table exhibits the legal rates of interest in the several states, and the penalties attached for *usury:*

STATE.	LEGAL RATE.	PENALTY FOR USURY.
Alabama............	8 per cent..	Forfeit interest and usury only.
Arkansas............	6 "	Forfeit usury only. (By special contract, 10 per cent.)
California............	10 "	By special contract, any rate whatever.

Connecticut..........	6 per cent..	Usurious contracts utterly void.
Delaware............	6 "	Forfeit whole debt.
District of Columbia..	6 "	Usurious contracts void.
Florida..............	8 "	Forfeit interest and usury.
Georgia..............	7 "	Forfeit interest and usury only.
Illinois...............	6 "	Forfeit interest and usury only. (By agreement, 10 per cent.)
Indiana...............	6 "	Forfeit double the usury. (By agreement, 10 per cent.)
Iowa..................	6 "	Forfeit 10 per cent on amount of contract.
Kentucky............	6 "	Forfeit usury only.
Louisiana............	5 "	Forfeit interest and usury.
Maine................	6 "	Excess deducted from amount due.
Maryland............	6 "	Usurious contracts void. (On tobacco contracts, 8 per cent.)
Massachusetts.........	6 "	Forfeit three times the usury and costs.
Michigan.............	7 "	Contract void for excess of interest only.
Minnesota............	7 "	By contracting in writing, as high as 12 per cent.
Mississippi...........	6 "	Forfeit usury and costs.
Missouri..............	6 "	Forfeit interest and usury only.
New Hampshire......	6 "	Forfeit three times the usury taken.
New Jersey..........	6 "	Contract void, and forfeit full amount of debt. Half to informer.
New York............	7 "	Contracts void; a misdemeanor.
North Carolina.......	6 "	Contracts void, and forfeit double the amount of loan.
Ohio.................	6 "	Excess credited on principal.
Pennsylvania........	6 "	Excess deducted from debt.
Rhode Island.........	6 "	Forfeit usury only.
South Carolina........	7 "	Forfeit usury, interest and costs.
Tennessee............	6 "	Forfeit excess only.
Texas.................	8 "	Forfeit interest and usury only. (By agreement, as high as 12 per cent.)
Vermont.............	6 "	Forfeit excess; when paid, may be recovered back, with interests and costs.
Virginia..............	6 "	Contract void; lender liable to penalty of *twice* the debt; recoverable in *qui tam* action.

Wisconsin........... 7 per cent..Contract valid; but no interest recoverable thereon. (By agreement, as high as 10 per cent.)

THE HOMESTEAD LAW.

The law gives to every citizen, and to those who have declared their intention to become citizens, the right to a homestead on surveyed lands, to the extent of one-quarter section; or 160 acres, or a half-quarter section, or eighty acres;—the former in cases in the class of lower priced land held by law at $1.25 per acre, the latter of high-priced lands held at $2.50 per acre, when disposed of to cash buyers. The pre-emption privilege is restricted to heads of families, widows, or single persons over the age of twenty-one.

Every soldier and officer in the army, and every seaman, marine and officer of the navy during the recent rebellion, may enter 160 acres from either class, and length of time served in the army or navy deducted from the time, is required to perfect title.

THE UNITED STATES LAND MEASURE.

A township is thirty-six sections, each a mile square. A section is 640 acres. A quarter of a section, half a mile square, is 160 acres. An eighth section, half a mile long, north and south, and a quarter of a mile wide, is eighty acres. A sixteenth section, a quarter of a mile square, is forty acres.

The sections are all numbered one to thirty-six, commencing at northeast corner.

The sections are all divided in quarters, which are named by the cardinal points, as in section one. The quarters are divided in the same way. The description of a forty-acre lot would read: The south half of the west half of the southwest quarter of section one in township twenty-four, north of range seven west, or as the case might be; and sometimes will fall short and sometimes overrun the number of acres it is supposed to contain.

CHAPTER XXXV.

PSEUDONYMS OF EMINENT MEN.

NOTED FICTITIOUS CHARACTERS AND PLACES.

ABDIEL, the name of an angel mentioned by the Jewish Cabalists. Mentioned in "Paradise Lost."

Absalom, a name given by Dryden in his satirical poem, "Absalom and Ahithophel," to the Duke of Monmouth, a natural son of Charles II.

Absolute, Captain, a character in Sheridan's comedy of "The Rivals."

Achitophel, a nickname given to the Earl of Shaftsbury.

Acres, Bob, a character in "The Rivals."

Adamastor, the Spirit of the Stormy Cape, *i.e.* the Cape of Good Hope, described by Camaëus in the Lusiad.

Adams, Parson, a character in Fielding's novel, "Joseph Andrews."

Admirable Doctor, a title bestowed on Roger Bacon (1214-1292), an English monk of astonishing scientific genius.

Adonais, a poetical name given by Shelley to the poet Keats, (1796-1821).

Agnes (Fr. *pron.* Anyes'), a young girl in Molière's "l'Ecole des Femmes," who is, or affects to be, remarkably simple and ingenuous. The name is applied to any young woman unsophisticated in the affairs of the heart.

Ague-cheek, Sir Andrew, a delightful simpleton in Shakespeare's "Twelfth Night."

Aladdin, "Arabian Nights' Entertainments."

Albany Regency, a name popularly given to a junto of astute democratic politicians, having their headquarters at Albany, who controlled the action of the democratic party for many years, and who had great weight in national politics. The effort to elect William H. Crawford president, instead of John Quincy Adams, was their first great struggle.

Al Borak, an imaginary animal of wonderful form and qualities, on which Mohammed pretended to have performed a nocturnal journey from the temple of Mecca to Jerusalem, and thence to the seventh heavens, under the conduct of the angel Gabriel.

Alceste, the hero of Moliere's comedy, "Le Misanthrope."

Allworthy, a character in Fielding's novel, "Tom Jones."

Alsatia, a popular name formerly given to Whitefriar's, a precinct in London. It was for a long time an asylum for insolvent debtors and persons who had offended against the laws.

Al Sirat (the path). A bridge extending from this world to the next, over the abyss of hell, which must be passed by every one who would enter the Mohammedan paradise.

Amaryllis, the name of a country girl in the eclogues of Virgil, adopted into modern pastoral poetry as the name of a mistress or sweetheart.

Ancient Mariner, the hero of Coleridge's poem of the same name, who, for the crime of having shot an albatross, a bird of good omen to voyagers, suffered dreadful penalties.

Andrews, Joseph, the title of a novel by Fielding, and the name of the hero. To ridicule Richardson's "Pamela," Fielding made Joseph Andrews a brother of that famous lady, and, by way of contrast to Richardson's hero, represented him as a model of virtue and excellence.

Angelic Doctor, Thomas Aquinas.

Apostle of Ireland, St. Patrick.

Apostle of Temperance, Rev. Theobald Matthew, a distinguished temperance reformer in Ireland and England.

Artful Dodger, a sobriquet of one of the characters in Dickens' "Oliver Twist." He is a young thief and an adept at villainy.

Audrey a country wench in Shakespeare's "As You Like It."

Auld Reekie, a name of Edinburgh, Scotland.

Baba, Ali, a character in the "Arabian Nights' Entertainments."

Backbite, Sir Benjamin, a censorious character in Sheridan's "School for Scandal."

Balderstone, Caleb, the faithful old butler in Sir Walter Scott's "Bride of Lamermoor."

Balma-Whapple, a pig-headed person in "Waverley."

Banquo, immortalized in Shakespeare's "Macbeth."

Bardell, Mrs., a widow lady in Dickens' "Pickwick Papers," who brought an action against Mr. Pickwick for breach of promise, founded partly on a letter addressed by him to her, of which the entire contents were "Chops and tomato sauce, yours, Pickwick." She was his landlady.

Bardolph, a follower of Falstaff in Shakespeare's "Merry Wives of Windsor," and two parts of "King Henry IV."

Barkis, a character in Dickens' "David Copperfield," in love with Peggotty, to whom he proposes by writing and displaying before her eyes the words, "Barkis is willin'."

Barleycorn, Sir John, in England and Scotland, a jocular name for ale or beer.

Bayard, the name given in old romances to Renaldo's famous steed, a wonderful animal of bright bay color.

Beatrice, the charming heroine of Shakespeare's "Much Ado about Nothing."

Beau Tibbs, a prominent character in Goldsmith's "Citizen of the World."

Belinda, the poetical name of the heroine of Pope's "Rape of the Lock."

Bell, Acton, a pseudonym of Anne Brontë, an English novelist, author of "Agnes Gray."

Bell, Currier, her famous sister Charlotte, author of "Jane Eyre," etc.

Bell, Ellis, their sister Emily, author of "Wuthering Heights."

Bell, Peter, the silly subject of a poem by Wordsworth, concerning whom the now hackneyed lines were written:

> "The primrose by the river's brim,
> A yellow primrose was to him,
> And it was nothing more."

Benedick, who marries Beatrice in "Much Ado about Nothing." The name is often applied to one who gets married after saying he wouldn't.

Biglow, Mr. Hosea, James Russell Lowell.

Black Monday, a memorable Easter Monday, 1351, very dark and misty. The name afterwards came to be applied to the Monday after Easter of each year.

Blue Laws, a name derisively given to the quaint regulations of the early government of New Haven Plantation, when the public authorities kept a sharp watch over the deportment of the people of the colony, and published all breaches of good morals and manners with often ludicrous formality. The laws as to the observance of Sabbath were terribly severe, descending to such particulars as that a mother, on that day, should not kiss her children, whilst absolutely no kind of work, even domestic, was permitted, and even walking was allowed only to and from church.

Bobadil, Captain, a beggarly and cowardly braggart, in Ben Jonson's comedy, "Every Man in His Humor."

Bomba, a sobriquet given to Ferdinand II., last King of the two Sicilies (1810-1859).

> After Palermo's fatal siege,
> Across the western seas he fled
> In good *King Bomba's* happy reign.
>
> —*Longfellow.*

The name is in derision, as King Puff-cheek, King Lear, King Knave.

Bowling, Tom, the name of a celebrated moral character in Smollett's novel of "Roderick Random."

Boz, Charles Dickens.

Brag, Jack, the hero of a novel of that name by Theodore Hook.

Bride of the Sea, a poetical name of Venice.

Bridge of Sighs, the name popularly given to the covered passage-way which connects the Doge's palace in Venice with the state prisons, from the circumstance that the condemned prisoners were transported over this bridge, from the hall of judgment to the place of execution. Hood has used the name as the title of one of his poems.

Brother Jonathan, a sportive collective name for the people of the United States, originated accidentally at Washington.

Bull, John, a collective name for the English nation, first used in Arbuthnot's satire, "The History of John Bull." In this satire the French are designated as "Lewis Baboon," and the Dutch as "Nicholas Frog."

Cabal, The, a name given in English history to a famous cabinet council formed in 1670 and composed of five unpopular ministers of Charles II.; the word is composed of the first letter of their several names: Clifford, Ashley, Buckingham, Arlington, Lauderdale.

Cagliostro, Count de, the assumed name of Joseph Balsamo, (1743-1795), one of the most impudent and successful impostors of modern times.

Caliban (a metathesis of *cannibal*), a savage and deformed slave of Prospero in Shakespeare's "Tempest."

Capability Brown, Launcelot Brown, a famous English gardener of the last century, so called from his constant use of the word "capability," as well as on account of his genius for making sterile or naked grounds fruitful and beautiful.

There is a very large or artificial lake (at Blenheim) which was created by *Capability Brown,* and fills the basin that he scooped for it, just as if Nature had poured these broad waters into one of her own valleys.—*Hawthorne.*

Carabas, Marquis of, a fanciful title employed to designate a man who possesses, or makes a boast of possessing, large estates; any pompous and purse-proud person. The name occurs in the nursery tale of "Puss in Boots."

Casella, the name of a musician and old friend of Dante, immortalized in "La Divina Commedia."

Cathay, an old name for China.

> Through the shadow of the globe we sweep into the younger day,
> Better fifty years of Europe than a cycle of *Cathay.*
>
> —*Tennyson.*

Caudle, Mrs. Margaret, the feigned author of "Curtain Lectures," by Douglas Jerrold.

Cid, The, a title given to Don Rodrigo Laynez, a Spanish nobleman of the 11th century, by five Moorish generals he defeated. He is regarded as the model of the heroic virtues of his age, and the flower of Spanish chivalry.

Cities of the Plain, name given to Sodom and Gomorrah.

Calin Clout, a name applied by Spenser to himself.

Cockagne, an imaginary country of idleness and luxury; hence in burlesque, London and its suburbs.

Cockney School, or *Cockney Poets,* a name given by critics to a literary coterie which included Leigh Hunt, Shelley, Keats and others.

Cologne, The Three Kings of, a name given to the three magi whose bodies are said to have been brought by the Empress Helena from the East to Constantinople, whence they were transferred to Milan. In 1164, on Milan being taken by the Emperor Frederick, they were presented by him to the Archbishop of Cologne, who placed them in the principal church of the city, "where," says Cressy, "they are to this day celebrated with great veneration.

Caphetua, an imaginary African king, of whom the legendary ballads told that he fell in love with the daughter of a beggar and married her.

Young Adam Cupid, he that shot so trim
When King *Caphetua* loved the beggar maid.
—*Shakespeare.*

Coverley, Sir Roger de, the name of one of the members of the imaginary club under whose direction the *Spectator* was professedly edited.

Cradle of Liberty, a popular name given to Faneuil Hall, Boston, Mass., celebrated as the place where the orators of the Revolution roused the people to resist British oppression.

Crane, Ichabod, the name of a credulous Yankee schoolmaster, whose adventures are related in the "Legend of Sleepy Hollow," in Irving's "Sketch-Book."

Crapaud, Johnny, a sportive designation of a Frenchman.

Crispin, the patron saint of shoemakers.

Cuttle, Captain, a character in Dickens' "Dombey and Son." His most famous saying is, "When found, make a note of."

Darby and Joan, the hero and heroine of a ballad, "The Happy Old Couple."

Deans, Effie, Scott's "Heart of Midlothian."

Della Cruscans, or *Della Crusca School,* a number of sentimental poetasters of both sexes, at the end of last century.

Delta, David M. Mair, a Scotch physician and poet.

Diddler, Jeremy, a character in Kenny's farce of "Raising the Wind."

Dixie, an imaginary place, somewhere in the Southern states, celebrated in popular negro melody, as a perfect paradise of ease and enjoyment.

Don Juan, a mythical personage who figures largely in drama, melodrama and romance as the type of refined libertinism.

Don Quixote, the hero of a celebrated romance of that name by Cervantes.

Drapier, M. B., a pseudonym under which Swift wrote certain celebrated and remarkable letters addressed to the people of Ireland.

Dulcinea del Toboso, the mistress of Don Quixote.

El Dorado (the golden land), a name given by the Spaniards to an imaginary country, supposed, in the sixteenth century, to be situated in the interior of South America, between the rivers Orinoco and Amazon, and abounding in gold and all manner of precious stones.

Elia, a pseudonym under which Charles Lamb wrote a series of celebrated essays.

Eliot, George, the literary cognomen of Mary A. Evans, afterwards Mrs. Cross; author of "Adam Bede," "Felix Holt," "Daniel Deronda," etc.

Emerald Isle, Ireland.

English Roscius, David Garrick (1716–1779), the most eminent actor of his day.

Emil, a beautiful character in Tennyson's "Idyls of the King." Emil is the Celtic form of *animus*, the soul.

Eternal City, The, a popular and very ancient designation of Rome.

Ettrick Shepherd, James Hogg, a Scottish poet (1772-1835).

Ex-calibar, the name of Arthur's far-famed sword.

Expounder of the Constitution, a title given to Daniel Webster (1782-1852).

Fata Morgana, the name of a potent fairy celebrated in the tales of chivalry, and in the romantic poems of Italy.

Father of Angling, Izak Walton, author of "The Complete Angler" (1593-1683).

Father of History, a name given to Herodotus, the Greek historian, by Cicero.

Father of Waters, a name given to the Mississippi on account of its great length (3160 miles), and the large number of its tributaries.

Father Prout, a pseudonym adopted by Francis Mahoney.

Faust, the hero and title of a celebrated drama of Goethe, the materials of which are drawn in part from the popular legends of Dr. Faustus.

Fern, Fanny, Mrs. Sarah P. Parton (born 1811), a popular American authoress.

Figaro, the hero of Beaumarchais's celebrated comedies, "Le Barbier de Seville," and "Le Mariage de Figaro."

Florimel, a character in Spenser's "Faëry Queen."

Flying Dutchman, the name given by sailors to a phantom ship, supposed to cruise in storms off the Cape of Good Hope.

Frankenstein, a monster in Mrs. Shelley's romance of that name, constructed by a young student of physiology, out of the horrid remnants of the church yard and dissecting room, and endued, apparently through the agency of galvanism, with a sort of spectral and convulsive life.

Freischütz (Ger. the freeshooter), the name of a legendary hunter or marksman, who, by entering into a compact with the Devil, procures balls, six of which infallibly hit, however great the distance, while the seventh, as one of the seven, belongs to the Devil, who directs it at his pleasure.

Friar John, the name of one of the most celebrated characters in Rabelais's romance of "Pantagruel."

Friar Tuck, one of the constant associates of Robinhood.

Gamp, Sarah, a monthly nurse of the old gin-drinking type in Dickens' "Martin Chuzzlewit."

Garden of England, County of Kent.

Garden of the World, a name frequently given to the vast country comprising more than 1,200,000 square miles which is drained by the Mississippi and its tributaries, a region of almost unexampled fertility.

Gate of Tears, a literal translation of the word *Babelmandeb,* the straits of which name were so called on account of the number of shipwrecks which occur in them.

> Like some ill-destined bark that steers
> In silence through the *Gate of Tears.*
>
> —*Moore.*

Genevieve, the heroine of a ballad by Coleridge.

Giant Despair, in Bunyan's "Pilgrim's Progress."

Gil Blas, the title of a famous romance by Le Sage (1668-1747), and the name of the hero.

Glasse, Mrs., the real or supposititious author of a cookery-book once very famous.

Gog and Magog, popular names for two colossal statues in the Guildhall, London.

Goodfellow, Robin, a kind of merry sprite, whose character and achievements are described in the well-known ballad beginning "From Oberon in Fairyland."

Great Unknown, a name given to the author of "Waverley Novels," which on their first appearance were published anonymously.

Grand Old Man, William Ewart Gladstone. Abbreviated G. O. M.

Grundy, Mrs., a person frequently referred to in Morton's comedy, "Speed the Plow," but not introduced as one of the *dramatis personæ.* The solicitude of Dame Ashfield as to *what will Mrs. Grundy say*, has resulted in the proverb.

Heep, Uriah, a hypocritical character in Dickens' "David Copperfield." He was a great deal too *umble.*

Iago, a character in Shakespeare's "Othello." "A being next to the Devil, and only not quite the Devil."

Ingoldsby, Thomas, a pseudonym adopted by the Rev. Richard Barham (1788-1845), author of the well-known "Ingoldsby Legends."

Irish Agitator, an epithet applied to Daniel O'Connell (1775-1847), the leader of the political movements in Ireland for the emancipation of Roman Catholics from civil disabilities, and for the repeal of the act of the Union between Great Britain and Ireland, which was passed July 2, 1800.

Iron Duke, a familiar title given to the Duke of Wellington.

Jarndyce, a prominent figure in Dickens' "Bleak House."

Jew, The Wandering, an imaginary personage who owes his existence to a legend connected with the history of Christ's passion. As the Savior was on the way to the place of execution overcome with the weight of the cross, he wished to rest on a stone before the house of a Jew, whom the story calls Ahasuerus,

who drove him away with curses. Jesus calmly replied, "Thou shalt wander on the earth till I return." The astonished Jew did not come to himself till the crowd had passed, and the streets were empty. Driven by fear and remorse he has since wandered according to the command of the Lord, from place to place, and has never yet been able to find a grave. According to another account he was Pontius Pilate's porter.

King Cole, a legendary king of Britain, who reigned, as the old chronicles inform us, in the third century after Christ. According to Robert of Gloucester he was the father of the celebrated St. Helena.

King Cotton, a popular personification of the great staple production of the Southern States.

Kitchen Cabinet, a name sportively given to the Hon. Francis P. Blair and the Hon. Amos Kendall, by the opponents of President Jackson's administration. Blair was the editor of *The Globe,* the organ of the president, and Kendall was one of the principal contributors to the paper. As it was necessary for Jackson to consult frequently with these gentlemen, and as, to avoid observation, they were accustomed when they called on him to go in by the back door, the Whig party styled them, in derision, the *Kitchen Cabinet*.

Knickerbocker Diedrich, the imaginary author of a humorous fictitious "History of New York," by Washington Irving.

Lake Poets or Lake School, a name applied to Wordsworth, Southey and Coleridge, but made to include Lamb, Loyd and Wilson. It arose from Wordsworth and the others having their residence in the Cumberland Lake district.

Learned Blacksmith, an epithet sometimes applied to Elihu Burritt (b. 1811) who began life as a blacksmith, and afterward distinguished himself as a linguist.

Lenore, the heroine of a popular ballad composed by Gottfried August Biviger (1748-1794) the German lyric poet. The subject of this ballad is an old tradition, which recounts the ride of a spectral lover, who reappears to his mistress after death,

and carries her on horseback behind him, "a fiction not less remarkable for its extensive geographical discrimination than for its bold imaginative character." This name was also adopted by Edgar A. Poe, in his ballad entitled "The Raven."

Light-Horse Harry, a sobriquet popularly conferred upon General Henry Lee (1756-1818), a gallant American cavalry officer in the war of the Revolution in allusion to his rapid and daring movements in battle, particularly during the campaign of the Carolinas.

Little Corporal, a familiar appellation conferred on General Bonaparte immediately after the battle of Lodi (1796) by the soldiers under his command on account of his juvenile appearance and surpassing bravery. The name continued in use even after he became emperor.

Little Nell, a child in Dickens' "Old Curiosity Shop," of a sweet and winning nature, who, on account of her grandfather's passion for gambling, goes through many trials with uncomplaining constancy.

Mad Anthony, a sobriquet of Major-General Anthony Wayne (1745-1796), distinguished for his military skill and impetuous bravery in the war of the Revolution.

Madman of the North, Charles XII. of Sweden; so called from his rash and impetuous character.

Magi, The Three.—The "wise men from the East" who came to Bethlehem bringing gifts to Jesus. *Magi* is the Latin for "wise men" in the Vulgate translation of the Bible. The traditional names of the three Magi are Melchior, represented as an old man with a long beard offering gold; Jasper, a beardless youth who offers frankincense; Balthazar, a black or Moor, with a large spreading beard, who tenders myrrh. They are the patron saints of travelers.

Malaprop, Mrs., a character in Sheridan's comedy of "The Rivals," noted for her blindness in the use of words. The name is obviously from the French *mal à propos*, unapt, illtimed.

Mason and Dixon's Line, a name given to the southern bound-

ary line of the *free* state of Pennsylvania which formerly separated it from the *slave* states of Maryland and Virginia. It was run, with the exception of about twenty-two miles, by Charles Mason and Jeremiah Dixon, two English mathematicians and surveyors between November 15, 1763, and December 26, 1767. During the excited debate in congress in 1820, on the question of excluding slavery from Missouri, the eccentric John Randolph, of Roanoke, made great use of this phrase, which was caught up and re-echoed by every newspaper in the land, and thus gained a celebrity which it retains.

Mill-boy of the Slashes.—Henry Clay (1777-1852), a distinguished orator and statesman, born in the neighborhood of a place in Hanover county, Va., known as *the Slashes* (a local name for a low, swampy country), where there was a mill to which he was often sent on errands as a boy.

Missouri Compromise, a name given to an act of congress passed in 1820, and which was intended to reconcile the two great sections that were struggling, the one to promote, the other to hinder, the extension of slavery. By this act it was determined that Missouri should be admitted into the Union as a slave-holding slate, but that slavery should never be established in any state formed in the future lying to the north of latitude 36 deg. 30 min.

Modern Athens, a name often given to Edinburgh, Scotland.

Mormon, the last of a pretended Hebrew line of prophets existing among a race of Israelites, who are fabled to have emigrated from Jerusalem to America about 600 years B. C. This imaginary prophet is said to have written the book called "The Book of Mormon," which contains doctrines upon which the "Mormons," or "Latter-day Saints" found their faith; but the real author was one Solomon Spalding (1761-1816), an inveterate scribbler who had been in early life a clergyman. Joseph Smith obtained the work, and claimed it as a direct revelation from heaven, and so began the propagation of "Mormonism."

Mumbo Jumbo, a strange bugbear, common to all the Mandingo towns, and resorted to by the negroes as a means of discipline.

Munchausen, the fictitious author of a book of travels filled with the most outrageous lies.

Mutual Admiration Society, a nickname popularly given in Paris, to the "Societe d' Observation Medical." It is employed in a general way of any knot of persons who are given to lauding one another absurdedly.

North, Christopher, or Kit, Professor John Wilson (1785-1854), author of "Noctes Ambrosianæ," etc.

Nut-brown Maid, the subject of a celebrated ballad of the same name of uncertain date and origin.

Old Bullion, Colonel Thomas H. Benton (1782-1852), a distinguished statesman, on account of his advocacy of a gold and silver currency as the true remedy for the financial embarrassments in which the United States were involved, after the expiration of the charter of the national bank, and as the only proper medium for government disbursement and receipts.

Old Grimes, the subject of a popular ballad by Albert G. Greene.

Old Hickory, conferred on General Andrew Jackson in 1813, by the soldiers under his command.

Old Hunkers, a name applied to the ultra-conservative portion of the democratic party especially in the state of New York.

Old Man Eloquent, an expression made use of by Milton in his tenth sonnet, an allusion to Isocrates, and very generally applied in America to John Quincy Adams, sixth president of the United States.

Old Public Functionary, sometimes applied to James Buchanan, fifteenth president of the United States. He first applied the expression to himself in his annual message to congress in 1859. Sometimes humorously abbreviated O. P. F.

Old Style Jonathan, an assumed name of Washington Irving.

Old Wagon, the frigate "United States," launched at Phila-

delphia, 1797. Nicknamed during the war of 1812, from her slow-sailing qualities.

Paper King, a name given to John Law (1670-1729) the celebrated financial projector.

Partington, Mrs., an imaginary old lady whose remarkable sayings have been recorded by the American humorist, B. P. Shillaber.

Peeping Son of Coventry, an epithet to a person of ungovernable inquisitiveness.

Pennsylvania Farmer, a surname given to John Dickinson (1732-1808) statesmen and author.

Philosopher of Ferney, Voltaire.

Poets' Corner, an angle in the south transept of Westminster Abbey, London; popularly so called from the fact that it contains the tombs of Chaucer, Spencer, and other eminent English poets, and memorial tablets, busts, statues, or monuments to many who are buried in other places.

Poor Richard, the feigned author of a series of almanacs, (commenced in 1732 and continued for twenty-five years), really written by Benjamin Franklin.

Poor Robin, the imaginary author of a celebrated series of almanacs first published in 1661 or 1662, said to have originated with Robert Herrick, the poet.

Peter Porcupine, William Cobbett (1762-1835), a voluminous political writer.

Pry, Paul, the title of a well-known comedy by John Pool, and the name of its principal character.

Pure Simon, the name of a Pennsylvania Quaker in Mrs. Centlivre's comedy, "A Bold Stroke for a Wife."

Rail-Splitter, The, Abraham Lincoln, who is said to have supported himself during one winter by splitting rails for a farmer.

Rare Ben, applied to Ben Jonson (1574-1637), the dramatic poet.

St. Nicholas, the patron saint of boys. He is said to have

been bishop of Myra, and to have died in the year 326. The young were universally taught to revere him, and the popular fiction which represents him as the bearer of presents to children on Christmas eve is well known. He is the Santa Claus of the Dutch.

Salt River, an imaginary river up which defeated political parties are supposed to be sent to oblivion.

Sam, a popular synonym for the know-nothing, or native American party.

Sand, Georges, Madame Dudevant, French authoress.

Seven Champions of Christendom.—St. George, the patron saint of England; St. Denis, of France; St. James, of Spain; St. Anthony, of Italy; St. Andrew, of Scotland; St. Patrick, of Ireland; and St. David, of Wales.

Seven Sleepers.—An ancient Christian legend tells that on the Decian persecution seven noble youths of Ephesus fled to a cavern for refuge, but were discovered and walled in; but having been made to fall asleep they were thus preserved for nearly two centuries. Their names are given as Maximan, Malchus, Martiman, Denis, John, Serapion, and Constantine. The church has consecrated the 27th of June to their memory.

Seven Wise Men of Greece.—They belong to the sixth century before Christ. Their names are Solon, Chilo, Pittacus, Bias, Periander, Cleobulus, and Thales. They were the authors of the celebrated mottoes inscribed in later days in the Delphian temple, "Know thyself" (Solon); "Consider the end" (Chilo); "Know thy opportunity" (Pittacus); "Most Men are bad" (Bias); "Nothing is impossible to industry" (Periander); "Avoid excess" (Cleobulus); "Suretyship is the precursor of ruin" (Thales.)

Seven Wonders of the World.—The Pyramids of Egypt, the Pharos of Alexandria, the Walls and Hanging Gardens of Babylon, the Temple of Diana at Ephesus, the Statue of the Olympian Jupiter, the Mausoleum of Artemisia, the Colossus of Rhodes.

Sharp, Becky.—A clever and unscrupulous adventuress in Thackerey's "Vanity Fair."

Sick Man of the East. The Turkish Empire.

Single-speech Hamilton. A name given to William G. Hamilton (1729-1796), an English statesman.

Starvation Dundas. Henry Dundas, the first Lord Melville, so-called from having first introduced the word *starvation* into the English in a speech in Parliament.

Stonewall Jackson.—Thomas Jonathan Jackson (1824-1863). At the battle of Bull Run July 21, 1861, Confederate General Lee, trying to rally his men, said, "There is Jackson standing like a *stone wall!*" Hence the sobriquet, and Jackson's brigade was called the *Stonewall* Brigade.

Sweet Singer of the Temple.—A name given to George Herbert (1593-1633), author of "The Temple," a singular sweet and clever poet, many of whose verses are fresh as a dew-laden rose.

Tartuffe.—A common name for hypocritical pretenders to religion.

Teazle, Lady.—The heroine of Sheridan's comedy, "The School for Scandal."

Thélème, Abbey of.—The name of an imaginary building in Rabelais's "Gargantua," given by Grangousier to Friar John:

> "Now in this Abbey of Thélème
> Which realizes the fairest dream
> That ever dozing bull-frog had."
> —*Lowell.*

Thunderer, The.—A popular appellation of the London *Times.* Originally given to it on account of the powerful articles contributed to its columns by its editor, Edward Sterling.

Twelve Apostles of Ireland, The.—A name given to twelve Irish prelates of the sixth century, who appear to have formed a sort of corporation.

Uncle Sam.—A vulgar name for the United States government.

Underground Railroad, The.—A popular embodiment of the

various ways in which fugitive slaves from the Southern states were assisted in escaping to the North or to Canada.

Urban, Sylvanus, Gent.— The fictitious name under which the "Gentleman's Magazine" is edited, and by which is expressed its universality of town and country intelligence.

Vermilion Sea.— A name formerly given to the Gulf of California on account of the red color of the infusoria it contains.

Wagoner Boy, The.— Hon. Thomas Corwin (born 1794), a distinguished statesman, who as a boy brought a wagon of provisions to Harrison's army, and remained with them.

Whisky Insurrection, The.— An outbreak in Western Pennsylvania resulting from an attempt to impose an excise law passed in 1791, which imposed duties on domestic distilled liquors. It was finally suppressed by an armed force under General Henry Lee.

CHAPTER XXXVI.

CLASSICAL AND MYTHOLOGICAL COMPENDIUM.

ACADEMIA, a pleasant and finely wooded spot in the vicinity of Athens, which derived its name from the proprietor, Academus, and became renowned as a spot where Plato taught philosophy to his pupils. These were thence termed Academies. *Academy* is bestowed, as a name, on seats of learning and education at the present day.

Achates, a follower of Æneas, so faithful and devoted, that his name has become proverbially significant of constancy and friendship.

Achilles, son of Peleus, King of Thessaly, by the sea-goddess Thetis, educated by Chiron, a learned centaur (half man, half horse). Achilles is represented as having become perfect in all the accomplishments of his heroic age, and had just attained the prime of youthful manhood when the princes of Greece went to war with Troy. In his youthful days Thetis had rendered her son invulnerable by dipping him in the river Styx; but the tendon of the heel by which she held him—hence called the *tendo Achilles*—was left unsecured; and Paris, the brother of Hector, slew the chief, by a wound in that spot, thus fulfilling the decree of fate. Strength, swiftness, and beauty of person are the leading characteristics assigned by Homer to Achilles.

Actæon, a huntsman, who beheld Diana bathing, and changed by the chaste goddess into a stag, was torn to pieces by his own dogs. The "fate of Actæon" means the ruin of man by his own

friends, or from unwillingly getting to know dangerous secrets.

Adonis, a youth greatly beloved by Venus, who on his being gored to death by a a wild boar converted him into the flower anemone.

Æneas, a Trojan prince, son of Anchises and Venus, who on the fall of Troy is said to have wandered with a small band into Italy, and founded the Roman empire. Virgil made this the subject of his great national epic.

Æolus, the god of the winds. The "Æolian harp" takes its name from him.

Æsculapius, a personage honored as the god of medicine, and reputed to be the son of Apollo by a mortal nymph.

Æsop, a native of Phrygia, renowned as a writer of fables.

Agamemnon, the leader of the Greeks in the expedition against Troy.

Aglaia, one of the three graces.

Agni, the Hindu god of fire.

Ahriman, the evil principle in the religion of ancient Persia.

Ajax, famous in the war of Troy; he became mad and slew himself.

Alcestis, wife of King Admetus, who voluntarily died for her husband's sake, and was brought again from the regions of the dead by Hercules.

Alcibiades, an Athenian noble, beautiful in person, and of rare talent, but dissolute; a pupil of Socrates; and in later life a splendid naval and military commander.

Alecto, one of the three furies.

Ammon, a Libyan divinity, adopted by the Greeks and identified with Jupiter.

Amphion, an individual of semi-divine origin, who founded Thebes, and is said to have excelled so much in music as to have moved the stones to take their places in the structures of the new city.

Andromache, wife of Hector, celebrated by Homer for her conjugal affection and domestic virtues.

Andromeda, daughter of an Ethiopian king, chained to a rock and exposed to a sea monster, but rescued by Perseus, whose wife she becomes.

Antæus, son of earth and Sea, a Lybian giant, slain by Hercules.

Apelles, a native of the isle of Cos, usually regarded as the greatest of the ancient painters.

Apollo, son of Jupiter and Latona, god of the sun, music, medicine, and the fine arts. A youth of fine form is often styled an Apollo, as the god is usually pictured as a beardless youth, holding a bow or lyre.

Arcadia, a pastoral region in the center of the Peleponnesus, so much distinguished for natural beauty and for the happy and simple life of its people, that the word has become proverbial.

Argo, a famous ship of antiquity, which is said to have carried Jason and a renowned body of Greeks — called the Argonauts — to Colchis, a district on the eastern shore of the Black sea, in search of the Golden Fleece.

Argus, a being with a hundred eyes, set by Juno to watch an earthly mistress of Jupiter, and slain by Mercury. A jealous custodian often receives the name of Argus.

Ariadne gave the clue to Theseus, shut up in the celebrated Cretan labyrinth, by which he found his way out. "The clue of Ariadne" has become a byword.

Aroin, a famous musician, who, when in peril of his life at sea, played so sweetly that some grateful dolphins bore him safely ashore.

Aristides, a statesman and warrior of Athens, whose conduct earned for him the title of *The Just.*

Aristotle, a Greek philosopher of the first rank, born at Stagira, in Macedon, and hence called *The Stagirite.*

Aspasia, a celebrated courtesan of Athens, mistress, and ultimately wife, of Pericles, and eminent for her intellectual accomplishments.

Astræa, the goddess of justice.

Atalanta, a princess of the isle of Seyro, of great beauty, and determinedly adverse to matrimony. As she excelled in running, she consented to wed him who foiled her in a trial of speed, and defeated all her lovers, until one came forward who was favored by the goddess of love. From that deity he received three apples, and was directed to throw them down at intervals in the race. The stratagem succeeded. Atalanta could not refrain from stopping to pick up the apples, and the lover obtained her hand. But from subsequent disrespect to Jupiter, the couple were changed into a lion and lioness. The race of Atalanta is often alluded to.

Atlas, a Titan, or giant, who warred against Jupiter, and was changed into a mountain.

Aurora, the goddess of the morning.

Avator, the descent of a deity upon earth in Hindu mythology.

Avernus, a lake in Campania, believed to be the entrance to the infernal regions.

Bacchus, the god of wine, son of Jupiter and Semele.

Bucéphalus, a horse tamed by Alexander the Great in youth, which became so renowned for bearing him on the field of battle as to give a common name to all animals of its species.

Cadmus, a prince of Phoenicia, who generally receives the credit of inventing letters, or at least of introducing them into Greece.

Calliopé, one of the muses.

Calypso, a beautiful goddess who, according to Homer, dwelt on an island of the earth, and received Ulysses hospitably as he wandered home from Troy.

Cassandra, a Trojan princess, who is said to have received the gift of prophecy from Apollo.

Castalia, a Parnassian fountain, sacred to the Muses.

Castor, son of Leda, whom the enamored god Jupiter is fabled to have wooed in the form of a swan. Leda bore at once two sons and two daughters: Castor, Pollux, Clytemnestra, and

Helena, of whom the second and fourth were deemed children of Jupiter, and the other two of the husband of Leda. Pollux on being elevated to a star, exhibited his love for Castor by seeking for the latter a share of his immortality.

Catiline, a noble Roman of great talents, but infamous character and habits.

Cato, a name borne by several illustrious Romans. Cato, surnamed the Censor, was famous for his valor, temperance, wisdom and eloquence. He mastered the Greek language when eighty years of age. He committed suicide after reading "Plato on the Immortality of the Soul."

Catullus, a Roman poet, whose pieces have much sweetness and feeling, though occasionally marked by immorality.

Centauri, a monstrous people of Thessaly, described as having the head, chest and arms of a man, placed on the trunk of a horse. The first use of horses for riding seems to have originated the fable of the Centaurs.

Cerberus, a dog with three heads, guardian of the infernal gate. Watch-dogs, and even guardian bipeds, frequently receive this name.

Ceres, the daughter of Saturn and Vesta, and goddess of corn and harvests.

Chaos, the rude, shapeless mass composing, according to the ancients, the yet unformed universe.

Charon, the ferryman who rowed the dead over the river Styx. As the boatman asked a fare, it was customary for the ancients to place a small coin under the tongue of the dead.

Charybdis, a deep whirlpool in the Sicilian seas, opposite to the rock Scylla. The combined dangers of both led to the saying—*Incidis in Scyllam, cupiens vitare Charybdim*: "Shunning Charybdis you on Scylla strike." The proverb has the same sense as, "Between the devil and the deep sea."

Chimæra, a fabled monster killed by Bellerophon, which had a triple head that breathed flame. Any monstrous thing of fancy is now called "a chimæra."

Cicero, Rome's most famous orator. His eloquence saved Rome from the tender mercies of Catiline, and he was termed by the people *the father of his country.* He was, however, afterwards driven into exile and finally murdered, at the instigation of Antony.

Cincinnatus, an illustrious Roman, who was taken from the plow, which he left with regret, to serve and save his endangered country. His task fulfilled, he again contentedly retired to his farm.

Circé a witch of semi-divine origin, whose irresistible enchantments drew many into her power, only to be changed, after a short career of voluptuousness, into filthy swine. Circe is evidently an emblem of debasing pleasure.

Cleopatra, whose surpassing beauty enslaved Mark Antony, and led to his ruinous contention with Cæsar Augustus.

Clio, the Muse of history.

Clotho, one of the fates, who held the distaff from which was spun the thread of life.

Carydon, a name in one of Virgil's pastorals, often applied to shepherds.

Charyphaeus, a title formerly given to the leaders of choral bands.

Crœsus, a king of Lydia, supposed to be the richest of mankind.

Cupid, god of Love, and son of Venus, queen of beauty.

Cyclops, a race of one-eyed giants, who acted as assistants to the smith-god Vulcan, and devoured human beings.

Dædalus, an Athenian of great skill in the mechanical and fine arts, to whom some ascribe the invention of the wedge, the axe, the wimble, and the level. He is also said to have constructed the labyrinth at Crete. He is the nominal prototype of all ingenious mechanics.

Damocles, a courtier, who having loudly flattered Disnysius of Sicily, on the score of his wealth and greatness, was placed for a time, by way of trial, on the tyrant's throne. Gazing

with delight on the splendor around him, he chanced to look up, when he saw, suspended above his head, by a single hair, a naked sword! Instantly his pleasure vanished. This is a stock illustration of the perils of greatness.

Damon and Pythias, two friends o. sucn constancy, that when the former was doomed to die, and sought for a respite, that he might go home and settle his affairs, the latter offered his life as a security for the return of the other. Damon returned, even to his friend's regret. The scene between them was so moving that it led to a pardon.

Danaë, the daughter of a king of Argos, was shut up in a tower because it was foretold that a son of hers should kill his grandfather. The god Jupiter, however, introduced himself in the form of a golden shower and Danaë bore to him Perseus, with whom she was exposed at sea in a slight bark, and who afterwards accidentally killed his grandfather with a quoit.

Danaides, the fifty daughters of king Danaus, who, to prevent the fulfillment of an oracle of fatal import, caused them to murder their husbands. All obeyed but one; and, for the crime, they were condemned perpetually to the fruitless task of filling a sieve with water, in the infernal regions.

Daphne, a nymph, who, when flying from the enamored pursuit of Apollo, was converted into a laurel tree.

Democritus, a personage called the "Laughing Philosopher," from his deeming it better to smile than weep at the follies of mankind.

Demosthenes, an Athenian, and the greatest of the ancient orators. He had originally a stammer, of which he cured himself by practicing speaking with pebbles in his mouth; to rise above the turbulence of a popular assembly, he harangued on the sea-shore during storms; he studied gesture and delivery before a mirror, and he was a diligent student of eloquence and learning. The greatest orators have been at least as consistent believers in hard work as in their native powers of genius.

Deucalion, a prince of Thessaly, who with his wife Pyrrha

escaped from a great deluge, said to have occurred in their time. The vessel rested on Parnassus, and Deucalion, directed by an oracle how to repeople the earth, threw stones over his shoulder, which instantly became men; Pyrrha did the same, and women were formed.

Diana, sister of Apollo, goddess of hunting, and in heaven called Luna, or the Moon.

Diogenes, the type of all sour, snarling philosophers.

Dionysius (the elder), tyrant of Sicily. He constructed a cave called "The Ear of Dionysius," which was of such a form that every word uttered by his prisoners in an adjoining prison could be heard by him. Dionysius, his son and successor, was so cruel that he was finally driven from his throne and compelled to teach school in Corinth for a living. Fallen despots are often compared to him.

Draco, a lawyer at Athens, whose statutes were so severe that they were said to be written in blood. Harsh edicts are often compared to them.

Echo, a nymph, whose powers of speech, as a punishment for prating, were limited to the answering of questions. Falling afterwards in love with Narcissus, that youth's cruelty caused her to pine away, and she was changed into a stone, which still retains the power of speech.

Endymion, a youth of Latmos, beloved of the Moon.

Epicurus, a celebrated philosopher, whose name has most unfairly become synonomous with a sensualist. He himself lived on barley-cake, and water from the spring.

Europa, a beautiful woman to whom Jupiter appeared in the shape of a bull, and she thoughtlessly mounting its back was carried off. She gave her name, it is further fabled, to the European continent.

Eurydicé, wife of the poet and musician, Orpheus. When she died from the bite of a serpent, Orpheus was so deeply grieved that he ventured to seek her among the shades; and, having by his music drawn "iron tears down Pluto's cheeks,"

was permitted by the infernal chief to take his wife back to earth, on condition that he did not turn to look at her till his arrival there. He violated the condition and lost her forever.

Fauns; these were minor rural deities painted as having the form of goats from the middle downwards, with the horns and ears of the same animal.

Flora, a goddess of the Roman Pantheon, who presided over flowers, gardens, orchards, vineyards, and was usually painted as crowned with flowers and holding the horn of plenty. She married Zephyrus, the god of the west wind, and received from him the gift of immortal youth.

Furiæ, the three Furies, *Alecto, Megæra* and *Tisiphone.* These sisters were supposed to be the ministers of divine vengeance, punishing mortals on earth both with external evils and the sting of conscience, and inflicting continual torments on the bad in the infernal regions.

Galatea, a sea-nymph, in love with Acis, whom Polyptemus, the Cyclop, killed through jealousy.

Ganymedes, a beautiful Phrygian youth, carried away by Jupiter to be cup-bearer to the gods in place of Hebé. An eagle conveyed him, and he is usually pictured on the back of that bird.

Gorgon, a name specially applied to Medusa, one of the three sisters who had wings of gold, and but one eye for use among the three. The "*Gorgon's Head,*" or "*Medusa's Head,*" is frequently alluded to as significant of an object of terror, because it was encircled with snakes and turned the beholder to stone.

Halcyoné, a princess who grieved so deeply for the loss of her spouse at sea that she was sent to that element out of pity, and changed into a kingfisher. Being favored with seven days' calm for brooding, the phrase of "halcyone days" came to denote a time of peaceful happiness.

Hannibal, a famous Carthaginian, who when a boy was made to avow eternal hatred to Rome. His crossing the Alps is regarded as a wonderful military feat. He nearly destroyed

the Romans, but was eventually overcome by Scipio Africanus.

Hebé, daughter of Jupiter and Juno, and the goddess of youth; for which, in its beautiful forms, her name is a synonym. She was the first cup-bearer of the gods.

Hecaté, the goddess supposed to preside over enchantments.

Hector, the most valiant of the sons of Priam, and ultimately killed by Achilles.

Helena, the most beautiful woman of her age, whose abduction from her husband, Menelaus, king of Sparta, by the Trojan prince, Paris, caused the siege and fall of Troy. Helen was one of the children of Leda by Jupiter. She was ultimately restored to Menelaus.

Helicon, a mountain in Bocalia, sacred to the Muses, who had a temple there.

Hercules, the most famous personage of the heroic age of Greece. He is the type of physical power in painting and sculpture, and is drawn with a mighty club in his hand.

Hero, a fair priestess of Venus, who, when her lover Leander perished in swimming the Hellespont, threw herself into the sea.

Herodotus, a famed historian of Greece, generally styled the "Father of History."

Hesperides, three celebrated nymphs, who, with a dragon for a watch-dog, were entrusted with the care of Juno's golden apples, placed in a garden in the neighborhood of Mount Atlas. Hercules in his labors carried off some of this much prized fruit.

Hippocrates, a physician of the isle of Cos, whose existing writings prove him to have made wonderful advances for his time in the art of medicine, and whose name is yet often alluded to.

Hippocrene, a fountain on Mount Helicon, the waters of which are said to have given inspiration to poets.

Homer, the greatest of epic poets, born, according to the most probable accounts, in the isle of Chios. His name signifies "the blind," and he is said not only to have suffered under this calamity, but to have been a wanderer, dependent on his minstrelsy for his daily bread.

Horace, a Roman poet of the age of Augustus, whose lyrics and satires abound in maxims that are often quoted.

Hygeia, the goddess of health, daughter of Æsculapius; hence the term *hygiene* for the art of preserving health, and the adjective *hygienic.*

Iphigenia, daughter of Agamemnon. That chief, while at Aulis on his way to Troy, was detained by contrary winds, and was told that only by his sacrifice of his daughter to Diana could the Greek fleet proceed on its course. He reluctantly consented; but when Iphigenia was brought to the altar she suddenly disappeared, and a goat appeared in her place. Diana carried her off, says the story, to be a priestess at Taurica.

Iris, the messenger of the queen of heaven, and the goddess of the rainbow.

Juno, sister and wife of Jupiter, and queen of the mythological heaven of Greece and Rome.

Jupiter, or *Zeus,* son of Saturn and Ops; king of heaven and ruler of all the gods.

Laocoön, a Trojan prince, priest of Apollo, who, having offended Neptune, was strangled with several of his sons by two enormous serpents which issued from the sea. This fable has been immortalized in sculpture.

Larés et Penatés, household gods of the Romans.

Leonidas, a renowned Spartan, who, when the Persians invaded Greece with several millions of men, took post at the pass of Thermopylæ, with no more than three hundred men, and, self-devoted to death, defended it for three days, until he and all his companions perished, after having made fearful havoc among the enemy.

Livy, one of the most illustrious of the Roman historians.

Mars, the god of war, son of Jupiter and Juno.

Mausolus, king of Corea, so dearly beloved by his wife that at his death she drank up his ashes and erected to him a monument so splendid as to be deemed one of the seven wonders of the world; hence *mausoleum.*

Mercury, or *Hermes*, son of Jupiter and Maia, and herald of the gods. He presided over oratory, commerce, thieving, and conducted the spirits of men to the infernal regions.

Minerva, goddess of wisdom, war, and the arts and sciences, who sprang, completely armed, from Jupiter's brain, without a mother.

Minos, a famous king and lawgiver of Crete, who for his equity was appointed one of the judges of the spirits of men after his decease.

Mnemosyné, the goddess of memory, and mother of the nine Muses by Jupiter.

Momus, the god of fun and pleasantry; jester-general and satirist of the mythological heavens.

Morpheus, son and minister of Somnus, the god of sleep; he visited mortals in dreams.

Naiads, certain minor deities, who presided over springs, fountains and rivers.

Nemesis, the goddess of vengeance.

Neptune, god of the sea.

Nestor, king of Pylos, who, at a very advanced age, went to the Trojan war, and is so highly lauded by Homer for his eloquence that his name has become a synonym for a wise and venerable old man.

Oberon, king of fairies.

Olympus, a mountain in Thessaly, which the ancients believed reached to heaven, and which they made the home of the gods.

Pan, the god of shepherds, huntsmen, and rustics. He invented the flute with seven reeds.

Pandora, the first woman, according to some ancient writers. Out of her box came all the ills that have afflicted mankind.

Plato, a great philosopher of the highest genius.

Plutarch, a Greek historical biographer.

Pluto, one of the sons of Saturn and king of the infernal regions.

Polyhymnia, the muse of singing and rhetoric.

Pomona, a Roman deity who had charge of gardens and fruit trees.

Pompey, called "the Great;" a Roman who made vast conquests; married the daughter of Julius Cæsar; was overthrown by Cæsar at Pharsalia, and having fled to Egypt was basely murdered.

Praxiteles, a native of Cnidus; famous for his skill in statuary.

Priam, king of Troy, an aged man when the Greek princes besieged and took his city.

Procrustes, a robber-chief of Attica, who bound travelers down to a bed, cutting off their limbs or stretching them out, so that they might exactly fit the couch; hence the phrase "a Procrustean bed."

Prometheus, one of the Titanic race; famed for his knowledge and address, and capable of deceiving Jupiter himself. To punish a fraud put upon him, Jupiter having taken away fire from mankind, Prometheus climbed the heavens and regained the element by theft. Jupiter still more provoked sent down Pandora with a box of ills, but Prometheus was too cautious to accept the gift. The supreme deity, however, chastised him by chaining him to Mount Caucasus, and sent a vulture to feed perpetually on his liver, which still remained undiminished. Hercules at length set the sufferer free. The stealing of the fire is supposed to refer to the discovery of its use. Prometheus is often referred to in literature, and Shelley, the poet, made the idea of him the theme of one of his greatest poems.

Proserpine, the daughter of Ceres and wife of Pluto, permitted to spend half the year in heaven at her mother's entreaties. The changes of the moon are supposed to be indicated here. Proserpine was universally worshiped under the names of Lilitina, Hecaté, and Libera.

Proteus, a sea deity, who possessed the gift of prophecy, but was extremely difficult of access, and, unless properly chained, had the power of assuming different shapes to elude his question-

ers. Proteus affords a favorite similitude to express a change of form or purpose

Psyché, a beautiful nymph whom Cupid married, and long lived with in a state of bliss. Venus put her to death, but Jupiter in pity made her afterwards immortal. As Psyché means "*the soul*," it is easy to attach a pregnant meaning to this myth. Psyché is painted with the wings of a butterfly.

Pygmalion, a sculptor of Cyprus, who, having made a beautiful ivory statue of a female, fell in love with his own work, and, by his prayers, moved Venus to animate it.

Pylades, a prince of Phocis, bound so closely in the bands of friendship with *Orestes*, that they are cited as exemplars of that feeling in its strongest form.

Pythagoras, a celebrated philosopher of Samos, who taught the transmigration of souls, and even said he remembered what bodies he had occupied before. He made his pupils keep silence for many years. The greatness of his talents is shown by his assertion that the planets move round the sun as a center—an idea at that time considered infinitely ridiculous.

Pythia (Pythoness), the priestess of Apollo at Delphi, who, inspired by vapors of the earth, delivered, amid convulsive writhings, the oracles of the deity.

Regulus, a Roman consul, who, in warring with Carthage, was taken prisoner, and afterwards sent home to negotiate peace. Aware of the reduced state of the enemy, Regulus advised his countrymen to continue the war. The noble hostage thus sealed his own fate, for he had promised to return to Carthage if peace was not obtained. He returned, true to his word, and after cruel tortures, was enclosed in a barrel full of spikes, and rolled down hill. Thus he died, but his name will never die. His unselfish devotion to his country, and his high sense of truthfulness and honor have immortalized it.

Romulus and *Remus*, the two brothers who founded Rome, were fabled by their proud descendants to be the sons of Mars by a princess of Italy. They were exposed in infancy, but were

saved and suckled by a she-wolf. The twins, on reaching manhood, resolved to found a city; but, for a trifling offense, Remus was slain by his brother. Romulus, however, with a band of fugitives and criminals founded Rome; and, as the neighboring tribes despised his followers, a plan was adopted by which mates were secured from the women of the Sabines. Romulus reigned thirty-nine years, and was then, so the fable goes, carried up to heaven. He received divine honors after his death.

Sallust, a Roman historian whose works are highly valued.

Saturn, son of heaven and earth, and supreme ruler of the earth until dethroned by his son, Jupiter.

Satyrs, minor deities of the country, shaped like goats inferiorly, and having horns on their head, and long hair over the body.

Scipio, the patronymic of an illustrious Roman family, one member of which, surnamed "Africanus," was the conqueror of Hannibal, at Zama. "The continence of Scipio," a common phrase, had its origin in the refusal of Africanus to see a beautiful princess, who had fallen into his hands, lest the frailty of human nature should tempt him to take advantage of his power over her fate.

Semiramis, a queen of Assyria, celebrated for her masculine strength of character, her warlike successes, and the magnificent buildings she constructed at Babylon.

Sibyls, women inspired by the gods with the spirit of prophecy.

Silenus, a son of Pan, and attendant on Bacchus, usually painted as a jolly, intoxicated old man, riding on an ass, and crowned with flowers.

Sinon, a Greek whose frauds before Troy have made his name a byword.

Sirens, three sea-nymphs who lived on a small island near Sicily, and so charmed the passing voyager with their melodious voices, that he forgot all else, and died while listening. Ulysses,

in order to hear them safely, had the ears of his crew stuffed, and himself tied to the mast of the ship. He was enchanted with the music, but the crew would not obey his commands to stop, and thus he listened and yet lived. The disappointed syrens threw themselves into the sea.

Sisyphus, a crafty prince of the heroic times of Greece, who, for some uncertain offense to the gods, was doomed in the infernal regions to roll a huge stone up a hill, whence it immediately descended, rendering his punishment perpetual. The hopeless toil of Sisyphus is often the theme of allusion and comparison.

Socrates, the wisest character, and one of the best of antiquity. He was born and lived in Athens, where, in an unpretending way he taught men to love virtue and cultivate knowledge. His opinions and actions, as recorded by his pupils, Plato and Xenophon, have filled posterity with admiration for him from whom they came. Socrates was at length accused by the ungrateful Athenians of offenses against religion, and died, according to his sentence, by drinking a cup of hemlock presented to him. His last moments, spent in cheerful converse with his weeping friends, exhibit his character in the noblest light.

Solon, one of the seven wise men of Greece, celebrated for the equity of the laws dictated by him to the Athenians. His fame for wisdom has caused men of similar repute to be called Solons.

Sphinx, a monster with the head and chest of a woman, a dog's body, a serpent's tail, and the wings of a bird, sent by Juno to devastate Bœotia. An oracle told that the Sphinx would destroy herself on one of her enigmas being explained, and Œdipus, on being asked by her what animal walked on four legs in the morning, two at noon, and three in the evening, correctly answered "man," referring to infancy, manhood, and old age. The Sphinx thereupon killed herself on a rock.

Stentor, a Greek whose voice, according to Homer, equaled those of fifty men combined, hence "Stentorian."

Stoics, a sect of philosophers founded by Zeno, who professed so grave and stern a morality that their designation has been applied to men who exhibit great powers of self-restraint and endurance.

Styx, a cold and venomous river of the infernal regions, famous on account of the estimation in which it was held by the gods, who swore by it, and considered such oaths inviolable.

Sybairs, a town on the bay of Tarentum in Italy, the inhabitants of which were so effeminate that "a Sybarite" has become an expression applied to any person of that character.

Tacitus, a Roman annalist of the Empire, whose writings have been deemed models of excellence in historical literature.

Tantalus, who for murdering his own son, and serving him up to Jupiter, to try his divine insight, was condemned to remain up to the neck in water, which ever fled from his lips as he sought to slake his perpetual thirst; hence the word "tantalize," now firmly fixed in various modern languages.

Telemachus, son of Ulysses, who showed his filial piety by traveling in quest of his father, when the latter wandered from place to place on his way from Troy. Minerva accompanied the young prince, under the form of an old man *Mentor,*— whence a common name for a counselor and guide.

Thespis, an ancient Greek poet, from whom, as the supposed inventor of tragedy, springs the phrase, "the Thespian art," applied to the drama.

Tihullus, a poet of Rome, whose graceful and chaste compositions have gained for him a first place among elegiac bards.

Timotheus, a poet and musician who followed the fortunes of Alexander the Great, and is celebrated by Dryden as "raising a mortal to the skies," that is, flattering his master as a divinity.

Tisiphone, one of the three Furies.

Titan, the gigantic family of the Titans, descended from the Heaven and Earth, warred against Jupiter, and tossed mountains at him in their fury, but were subdued and condemned to a heavy punishment.

Triptolemus, a native of Eleusis, whom Ceres sought to make immortal by laying him upon flames, to purge away the grossness of humanity; but his mother, through curiosity, peeped upon the proceedings, and, terrified at the sight, frustrated the design. In compensation Ceres taught Triptolemus the art of agriculture, and gave him the honor of its dissemination over the earth.

Triton, a leading sea-god represented as half a man and half dolphin, and always seen blowing a horn.

Tyrtæus, a Greek poet, usually held the type of martial verse writers.

Ulysses, King of Ithaca, usually deemed the wisest of the Greeks who went to Troy. After the close of the siege of that city, during which he carried off its Palladium, and performed many feats of address and valor, he underwent many years of adventure, described in Homer's *Odyssey,* ere he reached his home. There he found his means wasted by suitors to his wife Penelope; but the tried soon slew or dispersed them all, and resumed his throne in peace.

Urania, the muse who presides over astronomy.

Venus, the goddess of love and beauty, and mother of Cupid; she sprang directly from the foam of the sea. Her power to charm depended on her *cestus,* or zone, and she was usually represented as sitting in a chariot drawn by doves

Vesta, usually termed the mother of the deities, and patroness of the virgins called "Vestal," who like modern sisterhoods of nuns retired from the world to live in sacred establishments.

Virginia, daughter of the tribune Virginius, having attracted the licentious eye of Appius Claudius, then in power, he endeavored to get possession of her by proving her to be his slave; but her father defeated his nearly successful design by stabbing her with his own hands, to preserve her honor.

Vulcan, son of Juno, and god of fire.

Xantippe, wife of Socrates, and so great a shrew as to have given a name to all ladies similarly gifted.

Xenophon, an illustrious writer and soldier of Athens, who went to Persia to assist Cyrus in obtaining the throne of that country. When Cyrus was defeated the auxiliary Greeks made their way homeward, Xenophon latterly being their leader. This was the famous "Retreat of the Ten Thousand."

Zoroaster, a famous Persian sage, said to have founded or reformed the religion of the Magi.